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American Journal of Public Hygiene

VOLUME XVII

(A) is an abbreviation for Abstract.

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THE JOURNAL OF THIS ASSOCIATION has for sixteen years faithfully reflected the views of the public hygienists of Massachusetts. With the November issue of the year 1904, the encouragement received from many hygienic quarters induced the Association to undertake the expansion of the Journal to a national standard, with the co-operation of many noted sanitarians as editors. A new title was selected, while the older and well-established title was retained also.

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EDITORIALS.

THE ADVANCE OF SANITATION IN MEXICO.

It is a curious fact that the people of the United States have, until recent years, had but little knowledge of and sympathetic interest in their intimate neighbors in the south. They have looked upon Mexico especially as picturesque, but impossible to live in; a land of physical and social earthquakes.

They have rather suddenly awakened to the fact that such ideas are far from the truth. They are learning by experience the truth of that statement made so long ago by Cortez in his letter to his king, "that it is indeed a beautiful country and the character of the people most worthy of admiration."

If these things had been known in 1846, as they are now, that iniquitous war would never have been fought. No such invasion of Mexico would now be possible, but only that kind which was recently made by the American Public Health Association. This was an invited invasion where the only contest was as to the best methods of promoting public health, and the only fear on the part of the invaders lest they should break down under the load of benefits heaped upon them. There is this further difference between these invasions, that of '46 was a victory for the United States, while this of 1906 was clearly one for Mexico.

But it is for her relative rather than for her absolute sanitary accomplishment that Mexico deserves the victor's palm. The latter has been indeed large, but the former is simply phenomenal. Twenty-five years ago she was practically lacking in everything which modern science regards as necessary for public health, everything except a superb climate and men of willing minds. Cities were not sewered

nor supplied with pure water. Streets were not clean, nor properly paved. Food was not properly inspected. The result was an abnormally high death rate everywhere, and every foreigner especially, who went to one of the cities to live knew that he took a great health risk in doing so.

We do not by any means claim that sanitary conditions are now ideal in Mexico. In many parts we know the old conditions still exist to a considerable extent. But what we claim is, that Mexico has sanitarians of high rank, who recognize what needs to be done, and a government which promotes their work; and these are the two main factors of success in any public enterprise. Furthermore, when these two factors are represented by two such men as President Diaz and Dr. Edward Liceaga, the possibility of rapid accomplishment is greatly increased.

There has been none of the proverbial Spanish *manana* in the sanitary progress of Mexico for the last twenty-five years. It has been rapid, intelligent and solid. They began in the right way, by forming a central board called the Superior Board of Health, who took the initiative in organizing the work throughout the country. They also wisely decided that the capital city of the Republic, Mexico, should serve as an object lesson in sanitary matters, and so have obtained for it those excellent sewers, clean and well-paved streets, and supply of pure water, (the latter plant not yet completed), which they exhibited to their recent guests with such pardonable pride.

They have solved at enormous expense probably the hardest drainage problem that any city in the world has had. It is one of the wonders of modern engineering. The sewers connected with this, with their flushing arrangements, were thought worthy of a first prize by an international jury at our recent World's Fair. One hundred and twenty-five streets of the city of Mexico are paved with asphalt and kept scrupulously clean. The city has a steam disinfecting plant, and a municipal laboratory for food and

water analysis and examinations for infectious diseases. It has one of the largest and best free hospitals in the world, built and operated on the most sanitary lines. It has a penitentiary, a model of its kind, in everything pertaining to sanitation. It is constantly building school houses which are a delight to the hygienist, and its new public buildings are up to the same high stanitary standard.

This sanitary contagion has spread throughout the land so that there is not one of the chief cities of Mexico which has not completed already, or has projected, important sanitary improvements. This is especially true of the coast cities formerly such hot-beds of disease. Thus Vera Cruz finished a new water system in 1905, costing several hundreds of thousands of dollars, and in the same year a marine disinfecting and general sanitary plant, costing $500,000, and has a new sewer system well under way. The result is that yellow fever has been driven out from that city. Monterey finished a water and sewer system in 1903, costing $2,000,000, and Tampico did the same in 1904, though at less cost. Each city seems to be running a race with the capital city in sanitary improvements, because each city has the intelligent interest of the Superior Board of Health whose head is Dr. Liceaga, and in each is located some able physician, like Dr. Chico in Guanajuato, Dr. Brena in Zacatecas, and Dr. Iglesias in Vera Cruz, who are in thorough sympathy with the work.

As said above, there is very much that is unsanitary in Mexico, and they have a tremendous problem before them to impress hygienic principles upon their large, ignorant, tradition-bound poor element, but they are attacking the problem vigorously, and getting results worth a long journey to see. And the American Public Health Association which invited them to its membership about fifteen years ago may well take pride in and some credit to itself for their sanitary progress thus briefly outlined.

FRANKLIN C. ROBINSON.

THE AMERICAN JOURNAL OF PUBLIC HYGIENE

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THE MEXICO CITY MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION.

Dec. 3—7, 1906.

To those members who had visited Mexico City, 14 years ago on a similar errand, this meeting received many pleasant memories and also revealed many changes and contrasts. As the capital city is one of the four great countries united in the American Public Health Association, Mexico City presented peculiar claims on the Association as a meeting place, but its historical features, its climate, its architecture and above all its people, have far wider claims on more general grounds. Those members of the Association who visited it for the first time, while expecting to see an advanced civilization, were hardly prepared for the perfection in architecture, sanitation and hygiene shown in all of its new public buildings, schools, hospital and penitentiary, each a perfect model of its kind. The new postoffice challenges comparison, I think, with any building in the world, designed for a like purpose; it is most perfect in every detail, the interior furnishings and decorations consisting of artistically wrought bronze from Florence, Italy, and Mexico's own beautiful onyx, with the exquisite woods from which the furniture in the various offices were made, forming together a most harmonious whole. The development, system and modernity of life in Mexico City, flavored, it is true, with the peculiarities of the semi-tropics, is astounding. "Europe in America" was the dictum of one of the visitors, who could not but see that in shortcomings it only paralleled while in achievements it equalled and sometimes excelled the home cities of the visitors.

"Europe in America" may be particularized to "France in America." The relations between Mexico City and Paris have for many years been more intimate than with

Madrid or New York. It is to France that Mexicans have travelled for business as well as pleasure, for professional and post graduate study, for instruments and for inspiration. Spanish in language, customs and art, Gallic in thought and action, the Mexicans are interestingly composite. Those who believe France the most logical and clear-sighted of European peoples must admit that Mexico has chosen well and followed to advantage no mean mentor. Shrewdness without narrowness, thrift without meanness, patriotism, intelligent as it is intense, science reduced logically to practice—these are the results. But if Mexico, amongst Spanish surroundings, is French mentally, it is rapidly becoming American, physically—at least in manufactured articles. The street cars are made in St. Louis, "Mexican" spurs in New Jersey; expanded metal, cement mixers, shirts, harvesters—all are from the United States. But they are used with French shrewdness and *elan*

The meetings of the Association were arranged for by that quite remarkable leader in broad hygiene, Dr. Eduardo Liceaga, President of the Superior Board of Health, and were held in very comfortable quarters in the Conservatory of Music, close to the Municipal Palace, the President's Palace and to the Zocolo or park, at the head of San Francisco street. The meetings of the Section were held in a committee room of the Superior Board of Health on Santo Domingo square, not far from the Zocolo.

Matters of much technical importance to health officers were discussed but no adequate review could be made of these here. They will appear in due course in the transactions of the Association. The published program of the Association did not represent half of the papers presented, since notification of the Mexican contributions was not received until our arrival in Mexico. Of matters of more general interest perhaps the most important came up at the first meeting. Dr. P. H. Bryce, Medical Director of

the Canadian Immigration Bureau, presented a very striking address, the key note of which was the importance of sociologic study to the health officer. Sociology is perhaps the most pressing question of the times for all those having to do with government of any kind, and it is brought home acutely to those dealing with immigration. It also clamors loudly to the state and municipal health officer, but falls often on deaf ears—like the muck raker of Pilgrim's Progress, the health officer is usually so absorbed in the mere technicalities of his art, that he fails to appreciate wherein his efforts are part only of the gigantic whole of modern life—wherein his efforts may, if widened only a little, exercise untold effects upon the future. Dr. Bryce made it very forcibly obvious that the mere repetition day after day of the routine of notification, placarding, disinfection, etc., etc., can never place public hygiene in its proper place. These are the essential "manual of arms" —but no manual of arms ever won a victory in itself.

A happy provision resulted in the close proximity to Dr. Bryce's place on the program of two Mexican papers, calling for the enlargement of the powers of hygienists, the creation of a federal department of health in Mexico, and the necessity for large and broad co-ordination of public health activities. Incidentally one of these papers pointed out the seriousness of the lack of such central authority, in the case, specifically, of the San Francisco plague. Here occasion was taken to point out courteously but unmistakably the lack of a similar department in the United States, and that, in their efforts to prevent the entrance of plague into Mexico, the Mexican government could find, north of the boundary line "no adequate authority with which to deal." This arraignment of the United States was taken much to heart by the Association and a number of resolutions were presented, the one finally accepted by the Association being here reproduced.

"Whereas, The American Public Health Association is

of the opinion, and has heretofore so expressed itself, that public health matters confronting the four countries embraced in this association can only be adequately administered by extending the powers and duties of their several chief executive and administrative health officers, and

Whereas, This Association believes that such question can only be satisfactorily dealt with by the establishment of a national department of health with a cabinet minister at its head in each country.

Therefore, This Association, with a view to prosecute so desirable an end creates a committee consisting of three members from each of the four countries represented in the Association and to be nominated by the president, the first-named member for each country to be chairman of that sub-committee and the chairman of the sub-committee of the United States to be its general chairman. This committee shall formulate what in the opinion of the Association should be the extent of the work, powers and duties of a national department of health, and the sub-committee of any of the four countries shall take any steps deemed practical by it to carry out the purpose of this resolution, and to this end be empowered to enlarge its committee as it may deem proper."

Dr. John S. Fulton, in discussion, called attention to the recent address of Prof. Norton of Yale on this subject, to the endorsement of the American Association for the Advancement of Science which it received, and to the appointment of a committee of 100 to secure legislation. The striking feature of this movement is its advocacy by those outside of the ranks of the professional hygienist.

For the accessories of the meeting, the excursions provided by the Mexican Committee of Arrangements, under the guidance and stimulus of Dr. Eduardo Liceaga, nothing but the most grateful praise can be accorded. A reception by President Porfirio Diaz, giving an opportunity to see one of the intrinsically great rulers of the world, was per-

haps the most interesting of all. The Quarantine Station at Vera Cruz; the catacombs at Guanajuato; the new conduit and the proposed city water supply at Xochimilco; the hospital, built under Dr. Liceaga's control, and containing amongst other wonderfully progressive ideas, a regular primary school for convalescent of chronic cases amongst children; the personal examination of a considerable number of typhus cases afforded us by the courtesy of the hospital management; the inspection of the Research laboratory; the Bacteriological Routine Laboratory; the Chemical Laboratory, and the Pasteur Institute of the Superior Board of Health, to say nothing of receptions, concerts, etc., furnished material for the pleasantest reminiscences for many years to come. The only regrets associated with the trip were connected with the familiar faces and close friends who were not there. The sudden illness of Dr. William Bailey cast a gloom over the Association, which his courageous good temper and cheerfulness did much to lighten, and he was able to return with us, although as an invalid. While the high altitudes and sudden changes of temperature resulted in some minor complaints amongst the members, the visit to Mexico was singularly free of accident or disaster. H. W. HILL.

NOTE.—In recording the action of the American Public Health Association concerning federal departments of health in all four of the countries having membership in the Association, we wish to call particular attention to the meeting in Washington, Dec. 13-15, 1906, of the Conference on Medical Legislation and the National Legislative Council of the American Medical Association, reported in the Journal of the American Medical Association, Jan. 12, 1907, p. 152. Dr. A. S. Barchfeld, (M. C. 32 Penn. Dist.), there presented a bill for the creation of a Federal Department of Health, and invited criticisms and suggestions. Our readers should make a point of studying this bill.

JANUARY QUARTERLY MEETING
OF THE
Massachusetts Association of Boards of Health.

The annual (and quarterly) meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boston, on Thursday, January 24, 1907. Dr. Henry P. Walcott presided, and there was a large attendance of members.

THE PRESIDENT: Mr. Coffey, the active Secretary of the Association, is unfortunately detained in Worcester by business. Therefore it will be necessary to make a *pro tempore* appointment to that office. Dr. Palmer nominates Mr. Rickards of Boston. Is it your pleasure that he serve you in that capacity?

(Mr. Rickards was elected Secretary *pro tem.*)

THE PRESIDENT: As Mr. Rickards has no records to read, there will be no delay.

The next business on your program is the election of officers for the ensuing year. What action will you take?

DR. MARION: I move that a committee of three be appointed by the Chair to nominate officers for the ensuing year.

(The motion was seconded by Dr. Worcester and adopted).

THE PRESIDENT: I will appoint as members of that committee, then, Dr. Marion of Boston, Dr. Tobey of Clinton, and Mr. Newcomb of Salem.

The Executive Committee have approved the applications for membership of

Dr. John H. Nichols, Superintendent State Hospital, Tewksbury.

Louis A. Olney, of the Lowell Textile School, Lowell.

Dr. Burdett Arms, Assistant Bacteriologist, Boston Board of Health.

Dr. George A. Sargent, of the Boston Board of Health.

What action will you take with regard to these nominations?

(The four gentlemen named were elected members of the Association).

THE PRESIDENT: While your Nominating Committee is absent I presume there is no objection to going on with the program of the afternoon. If so, I will call upon the reader of the first paper, Dr. J. W. Proctor.

LEPROSY IN MASSACHUSETTS—ITS DIAGNOSIS AND SEGREGATION.

Illustrated by Stereopticon Views.

By J. W. Proctor, M. D.,

State Board of Charities.

Mr. President and Gentlemen: I want to change the order of parts of the paper and place leprosy in Massachusetts last, dealing first in a very brief way with the symptoms of the disease.

For convenience of description, leprosy is divided into three forms: the tubercular, the anaesthetic and the macular forms.

I will very briefly give the sequence of symptoms of each form.

Tubercular Form.—The first symptom of the tubercular form is the appearance of irregular, pale red, or dark brown pigmented spots, varying from one-fourth to several inches in diameter, smooth and glistening. These are seen chiefly on the back, face, and extensor surface of the extremities. Sooner or later these spots increase in size, become raised above the level of the adjacent skin, and nodules or tubercles form. The tubercles are the size of a bean to that of a

walnut, or larger. These are most abundant on the forehead, cheeks, lips, nose, beard, ears and eyelids. The cheeks become pendulous, eyebrows and beard fall out; hands and feet become swollen and covered with tubercles, and later on the lymphatics are involved. There is often a period of quiescence followed by the formation of a new crop of tubercles while the old ones ulcerate. Ulceration extends to the neighboring skin and deeper tissues. Next the mucous membranes are involved, iregular attacks of fever occur, showing involvement of internal organs. Finally mental symptoms manifest themselves. The patient becomes listless and helpless, he has no desire for food, diarrhoea sets in and he dies of inanition.

Anaesthetic Form:—In this form the first thing noticed is a crop of bullae containing a yellowish serum. These bullae break after a few days and leave a white, pigmented scar. Other crops appear and disappear. Sooner or later these white spots become tender and painful. This condition lasts for months. Finally anaesthisia succeeds hyperaesthesia and the patient often thinks that he is getting well. This anaesthesia finally involves large areas of skin and then extends into the deeper tissues. The subcutaneous fat disappears, theskin becomes dry and wrinkled, sweat glands destroyed, the hair falls out over the affected areas, muscles atrophy, hands and toes become contracted. Pressure on bony prominences causes ulceration and joints to open, fingers, or toes, or even a whole hand or foot may drop off. Mucous membranes are involved and leprous fever manifests itself as in the tubercular form. Finally the patient becomes dull and stupid, remaining motionless for days at a time. He gradually wastes away until relieved by death. The immediate cause of death is usually inability to take sufficient nourishment to prolong life.

Macular Leprosy.—This variety of leprosy usually has indefinite prodromal symptoms, after which the macules make their appearance upon the skin. They vary in color

from red to brown, and in rare cases may be white and glistening. After a variable length of time one of the other two forms of leprosy appears, and the case becomes either a tubercular or an anaesthetic one.

Differential Diagnosis.—The clinical features of a case of leprosy, typical in its development and advanced in its evolution, are so striking that it is impossible to confound it with any other disease. But in the early stages and even in fully developed cases with typical manifestations, there is no disease more difficult of recognition. In reading over the reports of cases examined by the Government Board of Physicians at Honolulu and various other places, I was surprised to see the large number of suspect cases reported, showing that even with these men, specialists in leprosy, it is oftentimes impossible, even for them, to make a positive diagnosis.

The diseases with which leprosy is most liable to be confounded are certain eruptions of the erythematous type, various pigmentary affections of the skin, more especially those of parasitic origin, as chromophytosis, tropical ringworm, vitiligo-morphoea, syphilis, cutaneous tuberculosis and certain diseases of the nervous system.

The prodromal symptoms which precede the eruptive stage of the tubercular form possess but little value. The attacks of fever followed by profuse perspiration are frequently taken for malaria. Their significance is seldom recognized until objective signs of the disease are manifest, and then these prodromal symptoms are of course valuable as a retrospective aid in the diagnosis. The sensory disorders, which form so valuable an element in the diagnosis of anaesthetic leprosy fail in the tubercular form, and their presence or absence may be disregarded.

The macular lesions often simulate ordinary erythema. They are distinguished by their localization, larger size, absence of desquamation, tendency to become nodular, and their slower changes of involution.

Syphilis presents many clinical analogies with leprosy, especially in its mode of involution. The roseola of syphilis corresponds to the erythema of leprosy, syphilitic pigmentation to the pigment spots of leprosy, syphilitic alopecia to the alopecia of leprosy, papules and tubercles of syphilis to the nodules of leprosy. In both the neoplasm follow a similar course of involution, they may undergo resorption, or they may soften and suppurate and disappear by a process of ulceration.

The erythematous syphilide may be differentiated from the leprous erythema by the smaller size and fainter colorization of the lesions, their absence from the face and limitation to parts habitually covered by the clothing, and their more rapid disappearance. The erythematous patches of leprosy are larger, more diffuse and more permanent.

It is, however, the tubercular form of syphilis which bears the most deceptive resemblance to leprosy. The syphilitic nodules are more circular in outline, more reddish brown or coppery in the cold, more apt to be grouped in circular and crescentic forms and more rapid in involution. The ulcerations of syphilis are more rounded, less circumscribed in extent, the crusts are thicker, harder, and of a brownish, blackish, or greenish tint. Leprous ulcers progress more slowly than those of syphilis, and they do not present a serpent-like mode of extension. The large superficial infiltrations of leprosy are not seen in syphilis. Leprous neoplasms are larger in volume, more protuberant and croned upon an infiltrated base with more or less oedema of the skin. Their seats of predilection are the face, lobes of the ear, backs of the hands and forearms, more rarely disseminated, while the nodules in syphilis are indiscriminate in their location, and may come where leprous tubercles rarely or never appear. The enormous nodular masses, the deep orbital and supra-orbital furrows, the pillowy-like protuberances of the cheeks with loss of eye-brows, are never seen in syphilis.

Syphilitic infiltrations of the mucous membranes also bear a deceptive resemblance to those of leprosy; they effect the same structures and are followed by the same extensive destruction of the tissues. The breaking down of the osseous framework of the nose, resulting in the broadening, flattening, and sinking in of this organ, is more common in leprosy. The harsh, croaking voice of leprosy, the difficulties of swallowing, respiration, the peculiar, foul odor exhaled, serve to distinguish it from syphilis.

The alopecia of leprosy differs from that of syphilis in that the scalp is not affected, while in leprosy the hairs of the eyebrows, eyelashes and beard only disappear.

Lupus vulgaris may be mistaken for leprosy, especially when the lesions consist of small, reddish-brown tubercles, grouped upon an infiltrated base and localized upon the cheeks or face. The frequent involvement of the lobe of the ear heightens the similitude. The infiltrations of lupus are more circumscribed in extent, limited in their localization, and not accompanied by anaesthesia.

Mycosis Fungoides.—Leprosy is characterized by and eruption of congestive spots or patches, which may appear and recede a number of times before becoming permanent. The erythematous patches of fungoides present a lighter or deeper red coloration; they are quite perceptibly elevated, with a more regular and distinctly circular contour, often surrounding islets of perfectly healthy skin. The macules of leprosy do not present the desquamating surface, nor the pointed, mammillated elevation of mycosis fungoides. When the fungating stage of mycosis is reached and the tumors soften and suppurate, the two diseases may be readily differentiated.

Fortunately, in case of tubercular leprosy a positive element of diagnosis is furnished by a microscopic examination. The bacillus of leprosy is invariably present in the leprous tissue and in no other.

The bacillus of leprosy was first observed by Hansen in

1871. It is stained more readily and decolorized more readily than the bacillus of tuberculosis. It has never been grown on artificial media, and is found in the blood only just before death. The best place to find the leprosy bacilli is in the anterior nasal cavities. It has been found there in 55 out of 57 cases of the tubercular form; 45 out of 68 cases of the anaesthetic form, and 27 out of 28 mixed cases.

Differential Diagnosis of Anaesthetic Leprosy.—In this form the spots may be a yellowish or fawn color, resembling chromophytosis; they are distinguished by the absence of scaliness and the parasite peculiar to this disease.

Vitiligo.—The patches of vitiligo are irregular in shape. dead white, margin convex and pigmented and clearly defined against the surrounding borders of healthy skin; the hairs of the leucodermic surface are often white, the skin normal, unaltered in structure or sensibility. In leprous leucoderma the spots are greyish white, and not so sharply defined. The skin is altered in structure, atrophia, depressed, often completely anaesthetic. The hairs of the affected parts fall out, sooner or later.

Morphoea and Scleroderma are distinguished by their waxy-white, lardaceous appearance, a hard, unyielding consistance, and a lilac border.

Syringomyelia.—The attacks of fever seen in leprosy do not occur in Syringomyelia. The muscular atrophy in leprosy appears first in the hands and feet, while in syringomyelia the proximal parts of the limbs are first involved. The symptoms characteristic of leprosy appear in no regular order. In syringomyelia the sequence of symptoms depends upon the seat of the disease in the spinal cord. When, as in most cases, the cervical or dorsal region is affected, then the upper extremities will be first attacked, the lower may escape for years and conversely. Leprosy attacks chiefly the small muscles of the hands and feet more seldom those of the fore arm and legs until later on.

It has been observed that where more than one mem-

ber of a family is afflicted they all have the same type of the disease.

Modes of Infection.—It is a question whether the virulent principle of leprosy may find entrance to the organism through cracks, fissures or abrasions of the integument. The fact that the first appearance of leprosy is commonly on the exposed parts, such as the face and extremities, and that in countries where the natives go barefoot, the plantar ulcer is often the earliest lesion, lends support to this view.

In leprous communities sexual intercourse is accepted by the laity and some of the profession as the mode of contagion, but the fact that the spermatic fluid is free of the bacilli and that the female organs of generation are notably exempt from leprous manifestations, would render improbable this mode of infection.

Mosquitoes gorged with blood which were found inside the mosquito nets of beds containing severe cases of leprosy were found to be free of the bacilli.

Infection by inhalation rests upon presumptive rather than positive proof. The sputum of leprous patients, which has been shown to be loaded with bacilli, disseminated through the air through particles of dust, may serve as a means of transportation of contagion.

Hutchinson advocated the fish theory as the cause of leprosy. The fallacy of the fish theory is shown by the fact that leprosy occurs among people who have never tasted fish, either through inability to obtain it, or because its use was forbidden by their religion.

Almost every article of food has in its turn been incriminated as an etiological factor.

There is not one exclusive mode of infection in leprosy, but it is probable that, like the bacillus of anthrax and of tuberculosis the mode of entrance of the parasite into the system is not single but multiple.

Race.—No race is immune to leprosy. There are racial peculiarities. It seems as if the black and yellow races are

the most susceptible. The white race shows a certain amount of immunity.

Climate.—Leprosy is not as prevalent in temperate and dry climates. It has not spread in our Northwestern States. Not a single native of the Northwestern States has acquired leprosy since it has been present there. As a rule, a hot moist or a cold moist climate favors the development of the disease. It has spread some in Louisiana.

Heredity.—The theory of heredity is an exploded one. No child was ever born with leprosy. There is no doubt but that a child born of a leprous parent or parents inherits a predisposition the same as a child born of tuberculous parents. Lepers are usually sterile. There were only five children born in the leper colony at Molakai during the first ten years after its establishment, although no restrictions were placed upon the intermarriage of lepers. If leprous women become pregnant they are apt to abort, or the child is stillborn, or very delicate. This is more pronounced if both parents are lepers.

Treatment.—The successful treatment of leprosy so far as a cure is concerned has been a dismal failure. Almost every drug has been tried at different times, and administered in different ways, but the most that can be said is that the treatment is only palliative.

Leprolin.—The treatment of leprosy by injection of leprolin is mentioned only to be condemned. The results have been disappointing to those using it, and its action is positively pernicious, in setting the bacilli free in the tissues and determining the development of new foci of the disease.

The so-called leprolin of Rost purports to be, like tuberculin, the filtered, germ-free fluid in which the specific bacilli have been cultivated, concentrated by evaporation and to which glycerin has been added for the purpose of preservation. The active principle of such a preparation is the toxins of the specific bacilli which have diffused into the culture medium during their growth.

All attempts however by bacteriologists to cultivate the bacillus of leprosy on artificial culture media has failed. Rost's attempts are, first of all, based upon a hypothesis which has no scientific foundation and his claim of having successfully cultivated the bacillus is wholly discredited by bacteriologists.

The treatment of such chronic diseases as tuberculosis and leprosy with the soluble toxins of the specific bacilli is most reasonably based on the theory that the toxins immunize the body ahead of the slow, chronic disease. But our knowledge of the failure to secure an effective immunity with the toxins of the tubercle bacillus under any condition and the notable failure of tuberculin as a curative agent in tuberculosis, makes the value of leprolin, if it could be produced, extremely doubtful. Rost's cultures were probably not leprosy bacilli and the reactions to injections of his preparation were probably due to proteids or other substances in the culture fluids, which, in the case of tuberculosis, will sometimes give the tuberculin reaction in animals susceptible to that disease.

Contagion.—There is quite a diversity of opinion in regard to the contagiousness of leprosy. On the one hand you will hear that it may be contracted by coming in contact with a case once or twice only, and on the other hand you will hear that it is almost the hardest disease to acquire. Those of the latter view will cite the case of the washerwoman at Molakai. They will say that husbands who have leprous wives and vice versa do not contract the disease in any larger proportion than among the community at large, that women have conceived and borne children by a leprous husband, and these children have leprosy, and yet the wife and mother escapes and, as afterwards observed, she has borne healthy children by a healthy man. Food cooked by lepers and eaten by non-lepers has many times failed to reproduce the disease.

But I hold the opinion that every one is not susceptible

to the disease. Did everybody who ever came in contact with our so-called contagious diseases, such as scarlet fever, small-pox, etc., contract each of them respectively, it certainly would be a dismal prospect for physicians and nurses.

When you hear of such cases as these just alluded to, they must be decided as cases possessing a personal immunity and the contagiousness of this or any other disease cannot be determined by these comparatively few cases.

Now when I stated that the white race showed a certain amount of immunity to this disease, do not misunderstand me. I was speaking of racial peculiarities.

There are many hundreds, if not thousands, of white people in Massachusetts today susceptible to this disease, if they should be exposed to it for any considerable length of time, and the thousands of our population who have colored and yellow blood in them must be more seriously considered.

A new source of contagion that must be taken into consideration is our recent annexations, Porto Rico and the Philippines. These places alone have added seventy to eighty thousand lepers to our population. With the invasion of these territories by our troops, mingling among unrecognized cases of leprosy, surely sooner or later, we will have cases here contracted in these places, where it is so prevalent.*

Through commercial zeal and enterprise, in the future a much closer and intimate relation will be held between us and these places where leprosy is so prevalent, and this, no doubt, will cause trouble for us.

Prophylaxis.—Observation shows that if a leper lives by himself, with separate rooms, bed, board, etc., and does not come into intimate contact with others, he is practically innocuous so far as contagion is concerned. But all lepers would not be willing to live peaceably by themselves. One

* Since this paper was read a case coming from the British West Indies has been discovered in Boston.

of our Massachusetts lepers would today run away and roam all over the world if he could obtain the chance, and so you see that in order to let a leper live near any cilivized community, with the privilege of having his own little farm and remaining on it, said leper must possess and exercise strong self-control, and keep by himself.

In cases where such a condition cannot be complied with they should be placed in a hospital specially provided for this class of patients.

All the secreta from the nasal passages should be collected and destroyed, also all the sputum expectorated should be collected in sputum cups and destroyed, also all dressings from sores.

There are, no doubt, several cases of leprosy in Massachusetts today unrecognized. If the physicians would only post themselves on this subject, recognize and report the cases early, this, together with the law compelling isolation, will make it comparatively easy to keep leprosy reduced to a minimum.

Leprosy is with us, and it is here to stay. Physicians must recognize this, and also that we are exposed to leprous communities today more than ever before.

Leprosy in Massachusetts.—The earliest case of leprosy in Massachusetts that I have been able to learn about was about thirty years ago. This patient was at Gallop's Island, and died there. Dr. Durgin of the Boston Board of Health found another case in East Boston several years after that.

In 1880 there was another case, one Charles Wilson, 30 years of age, single, born in Cuba. He was under observation from September, 1880, until August 27, 1884. He had the anaesthetic form and complained mostly of the plantar ulcer which he had, and was operated upon several times for this. He was in the Massachusetts General Hospital once only to my knowledge, and there he had his foot amputated. He left the state in 1884, and I know not whatever became of him.

The next case was a C. D. Derby of Salem. This man was born in Salem, but went to the Sandwich Islands when a young man. He remained there in the islands thirty years. He was quite an intelligent man, excelled in botany, and because of this knowledge he was gardener to the Queen for years, and no doubt had many lepers as helpers. He stated that he first noticed the brown spots about eight years prior to his leaving the islands for home. He was told that he had leprosy and that if he remained there he would be sent to Molakai. He started for Salem, his native place, and before he reached there it was known in Salem that he was coming, and the nature of his disease. He went to his sister's house and remained there one night and was carried to the Salem almshouse the next day. He had the tubercular form, one eye was destroyed, and the other involved to a certain extent. His case was reported Dec. 11, 1882. He was cared for at the almshouse in an attic room. The Salem authorities tried every means to have him taken at Tracadie and other places, and finally had to give it up. They decided to build a small house for him just outside of the almshouse, and did so, but he died about a week before it was completed, and the building stands there today.

In 1900 the Baker case was reported. Baker was a colored man, and had the tubercular form. He was placed on Gallops Island, remained there for a while, but finally escaped.

Three years ago there was not a known case of leprosy in Massachusetts, but inside of a period of one year and two days, five cases were reported, four of the tubercular type and one of the anaesthetic form, all cases being contracted abroad.

As none of these cases had legal settlement in any city or town of this Commonwealth, it became incumbent upon the State Board of Charity to take care of them. The State Board made every effort possible to have them trans-

ferred to some of the different leprosariums, but permission was denied from all of them. The various Boards of Health did not want to keep these cases permanently, and it was incumbent upon the State Board to buy a place and establish a leprosarium. Many places were considered, and finally Penikese Island was taken.

Present Massachusetts Cases.—Frank Pena.—The Pena case was reported April 22, 1904. He was then 37 years of age, married, born Cape de Verde Islands. He has been in the United States and Massachusetts for about twelve years, the past nine years in Harwich. He had a wife and eight children, the youngest of which was three months old when I first saw him. All were apparently healthy, and are, to my knowledge, so today. He first noticed the brown spots about eleven years ago. These have increased in size and number ever since, the tubercular masses the same. He has had several ulcers on his arms at different times, which have healed up readily, only to break out again and again. He has an extensive ulceration of the mucous membranes of his nose, throat and mouth. He has the croaking voice, and eyebrows and beard are gone, and there is extensive ulceration of the nose. In face, during the night that I drove him about fifty miles in a carriage on his way to Penikese his nose was bleeding nearly all night long. He is of a good disposition, and I think realizes what he has, but, like consumptives, still hopes that he will get well. Leprolin was used upon him, but the tubercles have become more prominent. He was treated by a number of physicians in several of our cities and towns, but his case was not recognized until it was diagnosed by a physician in a country town down on the cape who had never seen a case before, and to whom a good deal of credit is therefore due. Pena's physical condition today is very good.

Goon S. Dub. was reported on June 7, 1904. He was then 23 years of age. He has several tubercles on his face and

a few scattering ones on his body. He has several pigmented areas, and has had at various times an attack of what was probably leprous fever. Twice I have seen him when there was an erysipelatous inflammation around the nodules, and at these times the nodules were very prominent. Although the disease is not very extensive, he is not strong, and soon tires on exercising.

The John Roderick case was reported Oct. 7, 1904. He was born on the Cape De Verde Islands, and being a sailor, came to the Marine Hospital in Chelsea. He has been coming to this coast for the past thirteen years, off and on. He states that he noticed the first symptoms about nine years ago, when he "broke out in spots." Two years afterwards his face peeled, and ever since then the tubercles have been growing. He had extensive ulcers on each leg. also attacks of conjunctivitis, and the same croaking voice and muscular lesions. All the members of his family of eight have died or are suffering from this disease, with one exception. Pena and Roderick knew one another years ago when they were on the Cape Verde Islands, but had not met since, until the day the lepers were transported to Penikese.

Yee Toy was reported Jan. 18, 1905, is 25 years of age, and was born in China. This man's case is practically the same as that of the other Chinaman whom I have described, except that he is stronger. He has been in the United States for five years.

Isabelle Barros, reported April 24, 1905, is 27 years of age, born at the Cape de Verde Islands, is married and has two children, the oldest about three years of age. Both children are healthy. She has been in this country about four years. Through an interpreter I learned that her father probably died of leprosy. She gave a history of having had irregular attacks of chills and fever and of suffering for a considerable length of time from rheumatism. In fact, only a short time before I saw her she had been to a

hospital in one of our cities for rheumatism, and it was there that her case was first thought to be an incipient case of leprosy. I visited her weekly from April 24 until Nov. 16, 1905. At first she was quite weak, and presented several white patches, irregular in size and shape, especially upon her arms and legs. Although I found none that seemed to be anaesthetic, several places were hyperaesthetic. The muscles of the arms and legs were atrophied, especially those of the hands. There was a slight ptosis of the left side of the face, a small elevated pigmented area on the chin and a small tubercle on the ear. There was complete ulceration of the septum, she had the leprous coryza, and in smears taken from the nasal cavities hundreds of the bacilli of leprosy were found. As time went on she developed a small plantar ulcer which healed up two or three times and broke down again. In August she commenced to complain that she was losing the feeling in her left hand, and that it was numb all the time. This symptom still continues.

Charles Beals is 54 years of age, was born in New Orleans and is married. This man has had diseases of childhood, and had yellow fever 35 years ago. About five years ago patient noticed enlargements in his arms. He states that he has had slight chills off and on for the past two or three years, and more or less lassitude. He has a plantar ulcer on each foot; the first phalanx of the great toe on the left foot has entirely disappeared with retraction of the toe on the dorsum. There is also an ulcer of the same toe. About a year ago he had to give up work. The circulation of the extremities is very poor, the feet turning almost black upon standing; sensation is slightly impaired; fingers of both hands are dactylitic; there is a complete ulceration of the nasal septum; extensive ulceration of the soft palate; slight alopecia of the outer margin of each eyebrow; numerous nodules, propably of lymphatic glands, in both legs and arms; skin of hands appears smooth and shiny; disease is

more marked on left side than on the right. I took several smears from the anterior nares and throat; also, with cocaine, carefully dissected one of the glands on left forearm; microscopical examination shows the presence of many lepra bacilli. He has the characteristic harsh, croaking voice. The man has been a railroad messenger for the Adams Express Company for a number of years, and says that if he has contracted any bad disease, he lays it to the handling of packages of foreign money, which, he says, have been, in very many instances, not only exceedingly dirty, but very foul smelling.

The cottages where the lepers are now living are 36 feet long by 27 wide. Each contains four rooms, a general sitting room, two bed rooms, a kitchen, pantry, closets, and a bath room with open plumbing. They are situated on the westerly side of the island, with a good view of the ocean, and well protected by the natural conformation of island from the prevailing winds and storms of winter.

Upon an elevation between the cottages and the administration building has been built a reservoir, with a capacity of 10,000 gallons, into which water of a good quality is pumped. This water supplies the various buildings, and has sufficient pressure to answer all needs in case of fire. There is also a complete sewage system connecting all the buildings and running well out into the ocean.

The two Portuguese patients occupy one cottage, the two Chinamen another. The Barros woman with her attendant another, and the fourth is occupied by a male attendant.

THE PRESIDENT: Dr. Proctor's paper is now before you for discussion.

DR. DURGIN: I move a vote of thanks of the Association to Dr. Proctor for his interesting paper.

(The motion was seconded by several members and carried by a vote of the Association).

THE PRESIDENT: The next paper is one upon Rabies in Massachusetts, by Dr. Peters.

RABIES IN MASSACHUSETTS.

Symptoms, Importance of Early Diagnosis, and Practical Methods for its Suppression.

By Austin Peters, M.R.C.V.S.,
Chief of the Cattle Bureau of the Massachusetts State Board of Agriculture.

Mr. Chairman and Gentlemen:–

I have been requested to make some remarks at this meeting upon rabies in Massachusetts because the continuance of the outbreak which started in 1905, and the increased prevalence of the disease during the present winter, has kept up the public interest in this dangerous and troublesome malady, and makes it of special interest just now to sanitary authorities.

The word rabies is derived from the Latin *rabies*. The disease has been known from the earliest antiquity, and has been mentioned in the writings of the oldest authorities upon matters connected with medicine.

Aristotle describes it in the fourth century, B. C., who writes: "Dogs suffer from madness which puts them in a state of fury, and all the animals that they bite, when in this condition become also attacked by rabies." Allusions are made to it in the works of Virgil, Horace, Ovid and Plutarch. Aurelius Cornelius Celsius, a celebrated physician, was the first to describe human rabies and to employ the term "Hydro-phobia." It has been stated that rabies has existed in England from time immemorial, until within the last three or four years.

Rabies must have been quite prevalent in London in the middle of the eighteenth century to have inspired Oliver Goldsmith to write his Elegy on the Death of a Mad Dog:—

"Good people all, of every sort,
Give ear unto my song,
And if you find it wondrous short,
It can not hold you long.

In Islington there lived a man,
Of Whom the World might say,
That still a Godly race he ran,
When e'er he went to pray.

A kind and gentle heart he had,
To comfort friends and foes;
The naked every day he clad,
When he put on his clothes.

And in that town a dog was found;
As many dogs there be—
Both mongrel, puppy, whelp, and hound,
And curs of low degree.

The man and dog at first were friends;
But, when a pique began,
The dog to gain some private ends,
Went mad and bit the man.

Around from all the neighboring streets
The wondering neighbors ran;
And swore the dog had lost his wits,
To bite so good a man.

The wound it seemed both sore and sad
To every Christian eye;
And while they swore the dog was mad,
They swore the man would die.

But soon a wonder came to light,
That showed the rogues they lied—
The man recovered of the bite;
The dog it was that died."

Whether or not Oliver Goldsmith foresaw that some day a means for preventing hydrophobia would be discovered we do not know; as a young man he studied medicine, but it is not thought that he knew very much about it.

When rabies was first imported into North America is not known, but the following clipping from the Providence Journal which appeared in its columns during the latter part of August appears to indicate that it occurred here more than one hundred years ago:—

"The following extract from the Boston Gazette, of Feb. 12, 1797, has been sent to the Journal by a correspondent in Washington who has been reading the recent stories about mad dog scares in various parts of Rhode Island:

"Mad Dogs."

"On the 22nd ult. there appeared in Providence Neck a strange Dog, which fought with another till beaten off; after this as a man was riding his horse to water through a foot path, he met the first mentioned dog, which bit the horse near the breast. The dog went thence about a mile, and entered a barn by a window. The owner afterward going in was bit on the knee. He pursued the dog, accompanied by some neighbors, and found him engaged with a black woman, who defended herself with a tub she had in her hands. Being drove off he ran to a neighboring house, and crawled under the lintel, where he was shot.

"Happy for the person bitten he had on thick breeches, drawers, and stockings, but it is hoped that the linen and the woolen, through which his teeth passed, so far cleansed them as to prevent the flavor communicating; the person is however so much alarmed, as to have applied to several physicians for directions to prevent the dreadful effects which often ensue, and is pursuing the remedies pointed out. The dog which fought with the mad one was much bitten and is secured. In Freetown, Swansey, and Bristol,

several animals have been bitten by dogs supposed mad, and a child in the country northward is said to have died not long since from the bite of a mad dog. There being many more of these animals in Providence than are usual some further regulations seem necessary for the preservation of our citizens."

"No specific remedy has yet been published for the hydrophobia after it appears. It is recommended as soon as a person is bitten, to wash the part freely, and either cut out a piece of flesh, or dilate the orifice so as to make it bleed freely, washing off the blood for the same time, and then to keep open the wound by suitable dressings for a length of time, as no pains should be spared to prevent the poison being absorbed, this being to present almost the only hope of safety. Many in times past have been bitten and not affected; but when the affection has been so great as to occasion a dread of water, it is presumed none have recovered."

"Since the above was penned the writer was informed of a man at India Point having been bitten in the hand by a strange dog, possibly the one above mentioned. A cow bitten in the street about six weeks since by a strange dog, ran mad last week, and has been killed. One or more dogs have been killed in town, on showing symptoms of madness. A bitch that attacked her pups, killed some and wounded others, was immediately shot. Great care and caution are recommended."

The present outbreak seems to be simply a case of history repeating itself, similar epizootics occur every eighteen or twenty years, and although the present one may seem to be more extensive than any previous one it must be remembered that our population has increased amazingly, and with the increase in the canine population has kept pace, furthermore a better and more complete record of the cases has been kept during this outbreak than in any other heretofore.

Prior to the present outbreak Massachusetts appears to have been practically exempt from rabies for several years. There was not a single authentic case reported to the Cattle Bureau from September, 1903, to November, 1904, when a case was reported in a dog owned in Somerville, and in December a case was reported in Milton. Since then a number of serious outbreaks have occurred in various parts of the state. While it was quite prevalent in 1905 it has increased alarmingly in 1906.

During 1905 there were 98 cases in dogs, five in cattle and one in a pig, two persons died in Lowell after returning home from New York where they had taken the preventive treatment.

In 1906 for eleven months ending Dec. 1, 288 cases occurred in dogs outside of Boston, 38 in cattle, 6 in horses. In Boston the veterinarian of the Boston Board of Health states that there were 38 cases in dogs. A dog quarantined in 1905 also died of this disease after Jan. 1, 1906, making a total of 327 dogs to have rabies in the eleven months ending Dec. 1st in Boston and Massachusetts. Since the first of December this malady has been fully as prevalent and troublesome as it was before that date.

One hundred and ten dogs have been proved to be rabid in 1906 by Dr. Frothingham's examination, also seven cows, two horses and a boy. The other dogs outside of Boston reported as rabid were clear cases, most of them having a history of a bite from a rabid dog, and the cases diagnosed by agents of the Cattle Bureau.

Beside the animals reported there have been seven human deaths from this disease. The history in most of the cases has been that the victims were bitten by stray dogs, which they did not know to be rabid, and developed symptoms later and died without realizing that it was necessary to take the Pasteur preventive treatment.

In spite of this array of facts many persons can be found in the community who do not believe in the exist-

ence of this disease, or if they do are so fond of dogs that they are opposed to muzzling and restraining orders for its suppression. Many of these persons are people of ordinary intelligence and with fair education and are apparently sane in other respects. One would think that if these pseudo dog lovers have no regard for the lives and property of their fellow citizens they ought at least to realize that it is desirable to eradicate this disease in the interest of and for the protection of the very animals they profess to love, as it will be quite as much of a benefit to the dog population to have this outbreak terminated as it will be to other members of the community. If it could be explained to dogs of ordinary common sense and average unselfishness that if they would consent to wear an efficient muzzle, or submit to restraint for the next six months that the disease would practically disappear, any decent dog would gladly submit to these restrictions. Homeless and ownerless dogs would be quite as well off if humanely destroyed, as they are prowling about in a half starved condition. The canine population is quite as much the victim of its friends as is the rest of the community.

There is little time to say much about the symptoms of canine rabies, although this feature of the question has not received as much attention as it should owing to the amount of notice drawn to the existence of the disease and the damage done by dogs with rabies. There is much useful information to be derived by reading the back of a dog license, the law requiring that the Secretary of the State Board of Health shall furnish a description of the symptoms of hydrophobia to be printed on each dog license. First, attention is called to the fact that the law requires that every dog over three months old shall be licensed, and that each licensed dog shall wear a collar around his neck with a plate, upon which the owner's name and the license number shall be engraved. If this

provision of the law were better enforced, and all unlicensed, homeless, ownerless dogs and dogs whose owners did not provide collars prescribed by law were humanely destroyed it would be a great safeguard to the public. Half or two-thirds of the dogs which have appeared in towns with rabies and bitten other dogs, animals or persons have had no collar, or at least no collar with a plate upon it to show who owned the animal or where it came from.

Next on the license is some information upon the treatment of dogs, and the diseases of dogs, which do not seem essential to a dog license. Following this is a description of the symptoms of hydrophobia, which commences by stating that when rabies does not prevail it is a rare disease, and when it does it is not uncommon, and has a tendency to become epizootic. The symptoms then described give a very good idea of the behavior and appearance of a dog with either dumb or furious rabies. Then follows some excellent advice upon the course to be pursued by persons bitten by dogs supposed to be rabid, and also upon the treatment of a dog which has bitten any one.

Persons are advised against the folly of calling a dog rabid because it bites some one, and immediately killing it before it is definitely known whether it has rabies or not. In such cases the dog should be confined and kept under observation for several days; if at the end of a week it is apparently healthy no apprehension need be felt because of rabies. Never use a rope for tying up a dog under these circumstances, as it may gnaw it in two and escape. The owner of a licensed dog is also cautioned not to turn a dog loose to shift for itself because it appears to be sick or acts strangely, advice that has been disregarded with unfortunate results in many instances. Josh Billings said "the meanest thing a man can do to another except doing him an absolute injury is to do him a favor and then keep reminding him of it all the time." But it is meaner still to

kick a poor sick dog out of doors when you don't know what ails him.

It is also recommended in conclusion that the head of a dog supposed to have had rabies should be sent, packed in ice, to the Cattle Bureau, or to any laboratory equipped for making an inoculation test, in order to determine whether or not the animal had this disease at the time of its death.

It would be worth while for every health official in the State to obtain a blank dog license and familiarize himself with the instructions on its back.

Dogs developing rabies often act as though there was an obstruction in the throat, which is due to the difficulty in swallowing because of the paralysis of the pharynx. In these cases don't put a finger down the dog's throat in an attempt to remove the obstruction, as this is often followed by disastrous results. It is dangerous to put the finger or hand in a rabid dog's mouth even if it should not bite, as the skin might be abraded by a scratch from a tooth, or the virus may be absorbed through a fresh cut or scratch on the hand not inflicted by the animal's tooth. Many a veterinary surgeon has found out the danger of such a procedure to his cost. There is also to be noticed the partial paralysis of the lower jaw, the staggering gait, snapping at imaginary flies, the tendency to swallow foreign bodies, such as bits of wood, small stones, feathers, bits of leather and the like. There is often a disposition to run away from home when the disease is about to manifest itself, the animal may be gone a day or two and then return, or may never come home. Rabid dogs frequently run many miles from home, from twenty to forty or fifty miles not being an unusual distance to travel. A change in disposition is another premonitory symptom, the animal acting more affectionate than usual, or becoming morose. There may also be a change in appetite, a fastidious dog becoming voracious, and *vice versa.*

It is not unusual when the disease is developing for the patient to become sensitive, acting affectionately, and if scolded by the owner for attempting to lick the face and hands to suddenly take offense and snap at him. The drooping of the lower jaw, and acting as though there is an obstruction in the throat are not constant symptoms, and may be absent in some cases.

The change in the voice and some of the other symptoms are sufficiently described on the back of each dog license, already referred to. The bite of any carnivorous animal with rabies is dangerous. Occasionally a case is met with in the cat, but in the main it may be looked upon as a disease spread almost entirely by the canine family.

The importance of verifying a diagnosis of rabies in the dog as early as possible if it has bitten persons or other dogs is self-evident. The discovery of the Negri bodies has made it possible in most cases to do this within a day or two of the time of the dog's death, and thus valuable time is saved for persons who have been bitten, and it can be decided if it is necessary to have recourse to the anti-rabic treatment much earlier than formerly when the results of inoculation tests could not be known for about two weeks from the time the dog's head was received at the laboratory.

Great Britain furnishes the best demonstration that rabies is a disease that can be controlled and eradicated, as it has been entirely extirpated in England and Scotland, not a case having occurred there since 1903, while prior to that year it had existed there for centuries. The number of human deaths from rabies recorded during fifty-one years, from 1848 to 1898 inclusive, was 1112; the largest number in any one year was in 1877 when 79 deaths due to hydrophobia were recorded as having occurred among people. (Vide 17th Annual Report U. S. B. A. I.) The number of cases of rabies in England reported among animals in 1895 was 672, a remarkable increase over any

previous year. In 1894 the number of cases was 248. It is said the perpetuation of this disease was due to stray dogs. Of the 672 cases reported as occurring in 1895, two hundred and seventy-three were of this class, and it is suggested that the only means of eradication is to seize the ownerless animals. In the above total are included 55 other animals, five of them being cats. The seizure and slaughter of ownerless dogs as suggested in 1895, and muzzling those that had homes, materially reduced the number of cases of rabies in 1896. During this year 438 cases were reported, and 323 dogs were killed because they had been exposed to the infection. Nearly a third of those attacked were stray dogs. (Vide 14th Annual Report U. S. Bureau of Animal Industry.)

The 16th Annual Report of the U. S. Bureau of Animal Industry states that since 1897 the authorities in Great Britain have been endeavoring to eradicate rabies from the country, not only in the interest of the canine race, but also that of the human being. The muzzling order was enforced wherever necessary in the judgment of the authorities, and inspectors were employed to trace dogs that had been in contact with rabid dogs. Where such dogs were not killed they were isolated for a period of six months. The efforts in this direction are said to have met with marked success, and Dr. Cope (Chief Veterinary Officer to the British Board of Agriculture) says that: 'Unless the disease be again introduced from without, the date of its eradication is apparently not far distant.' "

In the 18th Annual Report of the U. S. Bureau of Animal Industry, it is stated, that "Not a person died of hydrophobia in Great Britain in 1900, the first time in fifty-two years that there had not been a human death from this disease. Dr. Cope says: 'It may truly be said that the board has never undertaken a duty which has rendered

so great a service to the community of this Country, from the point of view of human health, as the extinction of rabies in the dogs.'" In the 21st Annual Report of the U. S. Bureau of Animal Industry, Dr. A. C. Cope, Chief Veterinary Officer, is quoted as follows regarding rabies: "The last case of rabies confirmed in this Country occurred in the month of December, in the year 1902, and as diligent search has failed to discover any other, it is believed the disease is now extinct in the United Kingdom."

The above record of this great work and the results accomplished shows what can be done by the government when the people are thoroughly aroused to the importance of the situation. At present no one is allowed to bring a dog into England from any other country without keeping it in quarantine for six months, and having it examined from time to time by a veterinary surgeon.

Rabies has never been known in Australia, as every dog brought there must be kept in quarantine for six months after being landed.

Of course England and Australia are happily situated, as no dog can run in from any surrounding country. Unfortunately, in regard to rabies, Massachusetts is not an island and rabid dogs can run in here from Rhode Island, Connecticut or New York State, and start an outbreak at any time, after it may have been eradicated in this Commonwealth.

For the sake of comparison the number of cases of rabies in France for a single year may be interesting. In 1904 there occurred there 2393 cases of rabies.

There is abundant law upon the statute books of Massachusetts relating to dogs and contagious diseases to provide for the suppression and control of rabies; the difficulty seems to be in securing its proper enforcement. An order to keep dogs properly and securely muzzled or restrained from running at large for three months seems

to be hardly sufficient, judging from the dogs that have developed symptoms of this disease from four to five months after being bitten by a rabid animal, although these cases are exceptional. Most cases result in from a little over two weeks to eight weeks, between three and four weeks being a very common period. An order of this kind to continue in force for six months would be better, and it should be strictly and impartially enforced. Meanwhile the stray and ownerless dogs should be corralled and humanely destroyed.

Many of the contrivances sold as muzzles are not effective, and unless a dog in a town where a muzzling order is in force wears an efficient muzzle, he should be looked upon in the same light as a dog that does not wear any.

I have here various patterns of muzzles which may prove of interest.

While I feel that I might go into this subject much more fully, I fear that it might be wearisome to treat it at greater length at this meeting. Thank you for your kind attention.

(Dr. Peters then exhibited several forms of muzzles and commented on their efficiency or lack of it. Many of the leather ones, notably one making practically a figure 8, are simply evasions of the law, since while passing as a muzzle they do not prevent the dog from biting. One leather form, having a double strap around the nose, appeared efficient and at the same time probably more comfortable than a wire muzzle.

The wire muzzles are usually efficient and probably not particularly uncomfortable if of the right shape and size. One form shown would allow a dog to open and shut his mouth but would prevent his biting.)

THE PRESIDENT: Before proceeding to the discussion of this paper we will listen to two reports. Mr. Newcomb.

Mr. Newcomb, in the absence of Dr. Marion, Chairman of the Nominating Committee, presented the following report:

MR. NEWCOMB: The Nominating Committee, Mr. President, in selecting officers for the ensuing year, bring forward the old list, as follows: Dr. Walcott, President; Dr. Durgin, 1st Vice-President; Dr. Chapin, 2nd Vice-President; Mr. James C. Coffey, Secretary; Dr. Field, Treasurer.

The terms of 5 members or one-half of the Executive Committee having expired, the the following members have been nominated for a term of two years: Dr. E. L. Fiske of Fitchburg, Dr. C. H. Eidam of Lawrence, Dr. F. A. Woods of Holyoke, A. M. Wilson of Brookline, and Dr. M. V. Pierce of Milton.

THE PRESIDENT: Gentlemen, you have heard the report of your committee. What action will you take thereon?

DR. WORCESTER: I move that these nominees be made the officers for the ensuing year.

(The motion was seconded, and the nominees of the committee were elected officers of the Association for the ensuing year.)

DR. FIELD: Mr. Chairman, is there opportunity to bring in a little more business at this time?

THE PRESIDENT: The report of the Treasurer is certainly in order.

DR. FIELD: In addition to the report of the Treasurer I would like to recommend for honorary membership Dr. H. W. Hill of Minnesota. Most of us here will remember him as the bacteriologist of the Boston Board of Health

and as the editor of our Journal, reflecting credit upon us in every position he held, and giving us the opportunity of listening to many valuable papers. He is on our active list of membership, but as he cannot be with us it seems no more than right that we should honor ourselves by electing him an honorary member. I move that Dr. H. W. Hill of Minneapolis be made an honorary member of the Association.

DR. DURGIN: It gives me great pleasure to second this motion.

THE PRESIDENT: You have heard the motion made by Dr. Field and seconded. Is it your pleasure that Dr. Hill be made an honorary member of this Association? If so, you will signify it by saying Aye, contrary minded No. It is a unanimous vote.

THE REPORT OF THE TREASURER FOR 1906.

DR. FIELD then read the report of the Treasurer for the year 1906 as follows:

RECEIPTS.

Balance from 1905	$1329.07
Interest	41.22
Annual assessments for 1906	480.50
Annual assessments for previous years	50.00
Annual assessments for future years	19.00
Total	$1919.79

EXPENSES.

Postage	$46.00
Printing	26.75
Cigars and dinners for guests	37.05
Clerical Assistance	39.50
Treasurer's bond	4.00
Report of meetings	129.30
Printing Journal, two numbers	111.38
Use of stereopticon	10.00
Total	403.98
Balance to 1907	1515.81
Total	$1919.79

Of this balance, $1062.00 draws interest in the Central Savings Bank, Lowell.

Respectfully submitted,

JAMES B. FIELD, Treasurer.

Examined and approved as correctly cast and properly vouched for.

J. ARTHUR GAGE, Auditor.

January 18, 1907.

DR. FIELD: I would like to say that the Auditor in examining this report asked the question which I presume many of you would ask, "What are you going to do with this large surplus?" The Treasurer figured out very carefully that on our present ratio of expense we could not as yet reduce the assessment from $2.00 to $1.50 and meet our bills, and until our Journal becomes more self-supporting than it is at present it seems that we will have to continue at our $2 rate. I am in hopes that eventually, when the Journal becomes entirely self-supporting, we may reduce to a $1.50 rate, and possibly to a $1 rate, but at present the surplus has its uses, because if we should fail to make a satisfactory contract for the Journal we would in the course of a few months wipe out all the surplus that we have.

THE PRESIDENT: This most satisfactory report will be received and placed on file.

Before proceeding to the discussion of Dr. Peters's paper, I should like to report that at a previous meeting of this Association you appointed a committee to procure with regard to tuberculosis the same exclusion from the penalty of poverty when a case of tuberculosis is treated in a public institution or at the public charge that now prevails with regard to certain other contagious diseases. As a member of a commission which has recently made a report to the State of Massachusetts, a modification of the statutes to secure that object has been made a portion of the report, and I will therefore report that as the action of the committee appointed by this Association. That is, if the modifications proposed by this commission are adopted, and I have no question this action will be taken, the patient suffering from tuberculosis will be in the same category with the patient suffering from scarlet fever, smallpox, or any other

disease dangerous to the public health, and will not become a pauper by reason of that public aid.

Discussion of Dr. Peters's paper is now in order.

DR. PETERS: Mr. Chairman, one or two members of the Legislature have been to see me lately in regard to rabies, and some of them seem to have a similar idea as to people who have to receive state aid in going to Tewksbury and receiving the anti-rabic treatment, that they ought not to be considered as paupers because they have had to go to Tewksbury and receive treatment there, that they ought to be classed in the same category that you were speaking of extending so as to include people with tuberculosis.

DR. DURGIN: I am particularly delighted with Dr. Peters's paper. It should be very serviceable, with regard to these muzzles. I have recently seen in Boston no muzzle except that which has been subject to merited ridicule this afternoon. It does not seem to me that it is of any special use as a protection against the dog's bite. But it is extremely important, it seems to me, if we are going to muzzle dogs, that we should understand what a secure and substantial muzzle means.

PROFESSOR SEDGWICK: Mr. President, I have met with this statement,—and I wonder how much truth there is in it,—that the principal value of muzzling consists in the fact that it brings all kinds of dogs under inspection, the implication being that the muzzle as a muzzle did not amount to much anyway. I should like to ask Dr. Peters if that is a fact, and, in addition to that, whether he can tell us of any cases in which muzzling has really prevented a rabid dog from doing harm. I daresay there are such cases. I am simply very ignorant on this subject and should like information.

DR. PETERS: I don't think of any cases now, Mr.

Chairman, where rabid dogs with muzzles have bitten people. I think most of the rabid dogs that have done damage have been unmuzzled. I remember a case a year ago when they had a muzzling order in force in Grafton. A dog ran away from home one day; I think it was Sunday. He disappeared about one o'clock Sunday, just about dinner time, and the next morning he was down at Kingston, the next town to Plymouth; that is, he had run a distance of 40 or 50 miles in 18 hours. He had a muzzle on that consisted in a leather strap that was rather tight around his nose, and pieces from that, like the side pieces of a halter, that held it on went around the back of his neck and fastened there. I saw the head when it was brought to the office; the muzzle was still on, and I thought that that muzzle probably prevented the dog from doing any harm. I do not think that a muzzle necessarily has got to be made of wire to be an efficient muzzle, but it should be a contrivance to prevent a dog from biting. Some of these leather muzzles are efficient. They perhaps might be more comfortable to some dogs than a wire muzzle. But a wire muzzle is certainly a very good form of muzzle, I think as effective as any. A muzzle, made of leather, with a couple of straps around the mouth, and the nose stuck into it, and fastened round the neck, I think is an efficient muzzle. Some people might prefer a leather muzzle to a wire one. I don't mean to endorse any particular form of muzzle, but I think that the muzzle used should be an effective one. I also think that there is a good deal of truth in what Dr. Sedgwick says about the muzzle, whether it is effective or not, being a distinguishing feature. I think that a dog wearing any kind of a muzzle, when a muzzling order is in force, looks as though he had an owner who took enough interest in him to spend 25 cents for a muzzle anyway, and I think those dogs are not as likely to do harm as the stray dogs that have no owners and no homes.

MR. NEWCOMB: Mr. Chairman, doesn't it appeal to you if the enforcement locally of the dog license movement were done more effectually, it would accomplish a great deal towards preventing rabies canina? It strikes me so; it strikes me forcibly. I fancy there may be quite a proportion of those here who are dog lovers, undoubtedly they also love their own existence and the preservation of the same, but is there an animal that will leave its own kind and devote its time and service much more faithfully to you than a dog? It strikes me, and I feel just like saying it, that if each one of us when we go back to our respective communities will advocate a better enforcement of the dog license movement, a large part of this matter will be looked after, and incidentally I don't see why it would not be a good plan to look after cats too. (Laughter).

Now, the next point, with reference to the muzzling act. I would like to ask any man, with these different questions before him, if it does not seem to him that it would be a reasonable proposition to ask for a little more co-operation between the Cattle Commission and the local authorities on this dog license question. Could not a little advice be spread round, and would it not be beneficial? More particularly I would like to ask, now that the muzzling order is in force, and when you consider that the only place a dog can perspire is from his tongue, when is a dog at large? Is a dog at large when he is with you on the street on a leader? There are some salient points to be considered. Through the Chairman I would like to ask if Dr. Peters will enlighten us. Considering how little of this question we have had to consider within recent years, and the agitation at present, it brings up these points, and it seems as if, although I may be somewhat clumsy in presenting the matter, there still is something to be presented and something to be learned about it. I would like to ask if I go along with a dog that I know is good and all

right and has not been disturbed, if that dog is at large when it is on a leader with me on the street. These are simple points, but I speak as a dog man, valuing my own life as much as the average person without a doubt.

MR. PETERS: Mr. Chairman, the law states that aldermen in cities and selectmen in towns may order that all dogs shall be muzzled or restrained from running at large, and I think a liberal view to take of the law is that if a man has a dog on a leash he is restrained from running at large. I don't think that restraining him from running at large means that you cannot take him out and exercise him without a muzzle, if you want to. The same point holds good again, that if the dog is on a leash and a man is on the other end, it shows that that dog has got an owner who is not going to let him run off and do any damage, and that is what we want to prevent.

DR. BURR: In Boston, it seems to me as though we have had a little different experience in regard to rabies. It has not been in our stray dogs. Most of the dogs which have been affected in Boston have been licensed dogs, and if not licensed were dogs that received just as much care as a licensed dog, not being licensed simply from carelessness. We have not found it in what you would call stray dogs in a district. I want to emphasize what Dr. Peters said in regard to the muzzling of dogs. It seems to me that there is only one way in which we can eradicate rabies, and that is by the efficient muzzling or restraining of dogs. Dr. Peters said that we were unfortunate in that Massachusetts was not an island, but it seems to me, if I am right, that New England is an island in so far as its geographical relation to the rest of the United States. Having this in mind I think it is a point worth considering whether the New England states should not combine to eradicate rabies from New England. It seems

to me it is a way by which New England can be kept free from rabies.

DR. PETERS: Mr. Chairman, although the cases Dr. Burr has seen were licensed dogs, which had kind and loving owners who tied them up and sent for a veterinarian and then notified the Board of Health, I would like to know what the dogs were that bit these licensed dogs. I don't suppose they were cases of spontaneous origin exactly. Weren't they stray dogs that no one knew anything about and that disappered after they had done the mischief and then crawled off and died?

DR. BURR: Unfortunately, if my case is the same as the others, we don't find that dog. We have known of some dogs that have come into the city that were licensed dogs, and some licensed dogs have transmitted the disease to our licensed dogs in the city. My purpose was to show that even well cared for and licensed dogs do contract and transmit the disease. I certainly advise the picking up and humane destruction of unlicensed and homeless dogs.

DR. PETERS: Some licensed dogs in Boston have gone outside of Boston and carried rabies to outlying towns.

PROFESSOR SEDGWICK: Mr. President, I think this is a good time for us to remember that in all these health matters we are too much cut up into little town affairs, and have not that large way of looking at things that we ought to have. It is perfectly absurd for one town to have muzzles and another town nearby not to have them, or for one state in New England to have them and another one not. The splendid work which was done in Great Britain,—which ought never to be forgotten, for it is one of the monumental pieces of health work,—was done by virtue of the fact that they could control the whole district. Sooner or later we have all got to get away from

these ideas of little local town affairs, and realize that in these days, with state roads and railways and such like, our unit is much bigger than the old fashioned New England town. The sooner we get rid of that idea I think the better we shall get on in a good many health matters.

DR. PETERS: Mr. Chairman, I did not put it in my paper, but as a matter of fact I have done a good deal lately in the endeavor to try and get all the contiguous cities and towns to issue these muzzling orders at the same time. In Lowell, and Dracut, and Methuen, and Lawrence, and Haverhill, and Tewksbury, and Tyngsboro, and North Andover, towns in the Merrimac Valley, together, they have muzzling orders in force. And also they have done the same in Waltham, and Newton, and Watertown, and Arlington, and Brookline, and Quincy, and Hyde Park, and Dedham, and Westwood. By getting a large area where these orders are in force I think that perhaps we can make some progress in reducing the amount of rabies.

THE PRESIDENT: Is there any other business to come before the Association at this time? If not, it is moved that we now adjourn.

(The motion was adopted and the Association adjourned).

MUNICIPAL SANITATION.

By Charles V. Chapin, M. D.,

Superintendent of Health, Providence, R. I.

THE PASTEUR HOSPITAL FOR CONTAGIOUS DISEASES* represents in its construction and management the latest French ideas. At present the hospital, which is situated in a crowded part of Paris, consists of

*Rev. d'Hygiene, Mars 1903, p. 256.
Le Bulletin Medical, 19 Mars 1904, p. 251.
Soc. Med. des Hop. 1904, p. 297.

two pavilions of two stories, designed for 48 patients in each pavilion. The buildings are constructed in the most up to date manner to prevent the accumulation of dirt and facilitate disinfection. But the interesting feature of the establishment is the means taken to secure the isolation of the patients, one from another. In each pavilion are two wards with 12 beds each, for convalescents, though a later plan is to divide this into rooms for 3 or 4 patients. There are also on each floor 12 separate rooms with glass partitions. Each room opens into a central corridor and also onto a balcony or piazza. When a patient arrives at the reception room all the clothes are removed and the patient is carried on a rolling bed to one of these little rooms or cubicles. Each cubicle has its bed, table, chair, toilet, and eating utensils, and a bowl in which attendants are to wash and disinfect the hands. For the latter purpose, corrosive sublimate in the strength of 1-4000 is used. The doors leading into the corridor are often left open. The cleanliness of the operating room is maintained at all times. Scarlet fever, diphtheria, measles, small pox and other diseases are often cared for in cubicles opening into the common corridor, and by nurses and physicians passing directly from one to the other. Nothing goes out of a cubicle but to be at once disinfected. Nothing is brought in except what is sterile. When the nurse or physician enters the cubicle a gown kept in the cubicle is put on, the sleeves being rolled up so that the arms are bare; the patient cared for, the gown is removed, and the hands washed in corrosive solution, then with soap, and then rinsed again in corrosive solution, and then the next patient is visited. This practice is called *"antisepsie medicale"* and is as carefully carried out as is the asepsis of the surgeon. To treat scarlet fever, diphtheria and measles in rooms opening into a common corridor would by most of us be considered the height of folly, yet I saw this very thing being done in Paris last summer. The perfect manner in which this

medical antisepsis was automatically carried out by the nurses was remarkable. What are the results? In four years 2750 cases of all types of communicable diseases were treated in this manner with a transfer of infection in only seven instances, and not all of these were due to defects in the system. One was entirely due to a mistake in diagnosis and three may have contracted variola just before admission. The success of this hospital depends upon the admirable training of all connected with its management, and upon the discipline maintained, rather than upon details of construction. Dr. Gordon-Pugh, in the North Eastern Fever Hospital in London, is doing substantially the same work in crude home-made cubicles put up in an old wooden ward. It is assumed by some that the success of the Pasteur Hospital depends on the prevention by means of the cubicles of aerial convection. Thus I have seen an American hospital management put in cubicles, but take little or no more care than before, to prevent contact infection. It is worthy of note also that at the Hospital Enfantes Malades there are no real cubicles but merely glass screens between the beds, but the same system of medical antisepsis is followed as at the Pasteur Hospital and with excellent results.

RABIES IN PROVIDENCE. Between July 28, 1906, and January 31, 1907, there were killed in Providence about forty animals proved to be rabid by the presence of Negri bodies found in the brain after death. Many other animals were from the symptoms evidently rabid, and some of these caused the disease in dogs which they bit. During this time 51 human beings were bitten by presumably rabid animals and in nearly every instance demonstrably so. All but five of these people have had or are having the Pasteur treatment so called. Of these 35 went to the Pasteur Institute in New York. The expense of course was very great, and it was usually a good deal of trouble

to send the patients to New York. Since November the treatment has been applied at the Rhode Island Hospital in Providence. Arrangements have been made by which rabbits cords are sent on daily from the Board of Health of the City of New York and the emulsion is made in Providence and at once injected. It is a great comfort to the patients that they can remain at home, and a relief to the health department. Moreover as we pay a lump sum for the service for six months, in a doubtful case we do not feel that we are going to an expense which is perhaps needless. Since November twenty-third, ten patients have been treated or are being treated in Providence.

SANITARY ENGINEERING NOTES.

By Robert Spurr Weston, Assoc. M. Am. Soc. C. E.

STREAM POLLUTION BY ACID-IRON WASTE AT SELBY, OHIO.* The discharge of acid-iron liquors from a large factory into the city sewer decreased largely the nuisance due to its direct discharge into the river, but resulted in great damage to the purification plant, because of lack of capacity for the added flow, and because of the chemical effect on the filter. The effluent was very obnoxious because of the iron. The addition of the acid decreased the odor around the plant. A plant for the recovery of copperas was installed, recovering one-fifth of the acid and reducing the objectionable features of the sewage by 60 per cent. Addition of lime or ammonia might lessen them still more.

DISTRIBUITON OF SEWAGE BY SPRINKLERS.† Wm. G. Saylor, Resident Engineer Sewage Disposal Works, Waterbury, Conn., has recently made some ex-

*Eng. Rec., 55, 26.
†Eng. Rec., 55, 10.

periments on the relative efficiency of various forms of sprinklers for sewage filters. Revolving sprinklers, troughs and mechanical carriers being unsuited for severe winter climate, most of the experiments were made on nozzles, which were found very satisfactory. He found it necessary to use nozzles having large water ways and few openings, with a mechanical device for control under a dropping head. As nozzles in general have to cover a square area with uniform spray the cross section of the deflectors was made fluted rather than circular.

PURIFICATION OF SEWAGE AT STRATFORD-ON AVON§. A plant for the purification of sewage at Stratford-on-Avon has recently been completed, including "liquefying" tanks, percolating filters, sand filters and land treatment or broad irrigation. The plant is designed to treat 300,000 gals per day, dry weather flow, including trade waste, as well as 600,000 gals. storm flow. For further storm flow up to 900,000 gals. there are extra contact beds. The liquefying tanks have a capacity of 1 1-2 times the dry flow; percolating filters have an area of about 1-2 acre. There are about 2 acres of intermittent sand filters; about 10 acres of ground soil with underdrains are provided for the land treatment. The capacity of the contact beds is about 3,000,000 per acre per 24 hrs. Cost of work about $114,000.

STERILIZATION OF SEWAGE AFFLUENT† at the Mass. Institute of Technology Sewage Disposal Station. Phelps and Carpenter state that ordinarily it is not the function of sewage filters to remove bacteria from sewage. function of sewage filters to remove bacterial from sewage. Disease germs may survive rapid filters. Shell-fish bear-

§Eng. News, 56, 658.
†Tech. Quart., 19, 382.

ing waters must not be polluted. Either sand filtration or chemical sterilization must be used for their protection. Effluents can be freed from objectionable bacteria by chlorine, either from chloride of lime or as a gas, at a cost of $1.05 per million gallons. Electrolytic chlorine might be used at a cost as little as $0.85. Copper sulphate is the most promising of the other agents tried.

IS IT WORTH WHILE TO STRIP THE SURFACE SOIL FROM RESERVOIR SITES?* This long abstract of a long report concludes,—

First: That the stripping of the Ashokan Reservoir, in itself, will not sufficiently prevent tastes and odors so as to allow water of satisfactory quality to be obtained from it at all times.

Second: That aeration at a small fraction of the cost will do fully as much in removing tastes and odors as stripping would do in preventing them.

Third: That water of perfectly satisfactory quality can be obtained by aeration and filtration.

Fourth: That this result can be just as certainly and fully accomplished in this way if the Ashokan Reservoir is not stripped, as if it is stripped.

METHOD FOR TESTING AND COMPARING SEWAGE SPRINKLERS.† The author describes the types of sewage systems; also tests of sewage sprinklers. From the results of these experiments the so-called distribution coefficient has been derived mathematically. The use of this permits one to make experimental comparisons of sprinklers with greater precision.

*Allen Hazen and Geo. W. Fuller. Eng. News, 57, 8.
†Earle B. Phelps, Eng. News, 56, 410.

REFUSE DISPOSAL IN THE BOROUGH OF RICHMOND, CITY OF N. Y.‡ As the result of two years' study and investigation, the authorities of the Borough of Richmond, New York City, have made public plans and specifications for a mixed municipal refuse destructor. Work has been under the general direction of L. L. Tribus, C. E., and the personal charge of J. F. Featherston, C. E.

The Borough is divided into two collection districts. The transportation problems were serious and no existing garbage crematory was found which satisfied the conditions. The British method of destroying mixed wastes seemed to be the most promising and investigation was directed toward the feasibility of using this process. The average amount of ashes and rubbish collected in the district is 2.77 cu. yds. or 1.16 short tons per 1000 inhabitants per diem. These materials range from about 85 per cent. of the total refuse during the winter to about 50 per cent. in the late summer. The average amount of garbage (swill) is 0.91 cu. yds. or 0.425 ton daily per 1000 people. The amount ranges from less than 15 per cent. of the total refuse during the winter to about 50 per cent. in the late summer. Of the entire refuse for one year 34.7 per cent. by weight was fine ash, 1.8 per cent. was clinker, 4.8 per cent. was glass and metal, 26.7 was coal and cinders rejected by the screens and not otherwise classed, 22.6 per cent. was vegetable garbage, 1.2 per cent. animal garbage, 1.1 per cent. free water lost in handling the garbage, and 7.1 per cent. rubbish. The coal and cinders had an average calorific value of 4900 B. t. u., the garbage 8240 B. t. u. after drying, the rubbish 8440 B. t. u., while the fine ash and clinker had no calorific power.

The destructor must be capable of burning 120,000 lbs. of mixed refuse of the general composition that occurs in

‡Eng. Rec., 54, 628.

winter. The report shows the general arrangement of the plant. The destructors are to be built after the English type and are to be arranged in cells. The plant is to be run week days and cleaned on Sundays. The contractor must guarantee that the residue shall be hard, free from organic matter and thoroughly burned; that it shall be without nuisance; that the temperature of the combustion chamebr or main flue shall not fall below 1250° F.; that arrangements must be made for the withdrawal of the dust after one day's cooling of the fires; that a minimum or seasonal rate of evaporation and also an amount of net useful steam per pound of refuse burned be guaranteed; that the amount of material that can be handled during an 8-hr. period by a high grade stoker must be stated and that the refuse must be destroyed at the rate of 2 1-2 tons per hour when its character is that shown by the data. It is supposed to utilize the excess heat for raising steam, but no use for the steam has been proposed, beyond driving the machinery in connection with the plant itself.

EXPERIENCE WITH FINE GRAIN PERCOLATING FILTERS.* Dr. George Reed gave evidence before the Royal Commision on Sewage Disposal concerning the operation of a sewage bed at Hanley, England. Results were presented after three years' experience. The filters recivd sptic tank effluents. The beds were of fine material, 1-4-inch to 1-8-inch.) 73 per cent. of suspended solids were removed in the detritus tanks and 15 per cent. in the septic tank effluents. The bed swere of fine material, (1-4-inch to 1-8-inch.) 73 per cent. of suspended solids were removed in the detritus tanks and 15 per cent. in the septic tank. Sewage applied to filters contained 7.6 parts of suspended matter per 100,000, exactly one-half of which was mineral matter.

*Eng. Rec., 54, 444.

The suspended matter is practically all retained in the top layer of the filter, where the organic portion is said to be liquified. It required 12 minutes for the sewage to pass down through the upper foot of the filters, where most of the purification is effected, while 35 minutes were consumed in the passage of the sewage through the filter. There is more free ammonia in the sewage 4.5 ft, below the surface of the filter than 1 ft. below and the reduction in albuminoid ammonia and oxygen consumed is equally striking. Most of the nitrification takes place in the upper foot.

The author believes that fine trickling filters are less liable to clog at the surface than are coarser ones, unless comparison be made with very coarse filters such as those in use at Leeds.

Regarding the alleged defective aeration of fine beds, the author states that the high nitrification is a refutation of this argument. The experiments showed that there was a free current of air through the filters. After the experiments were completed it was shown that the filter material was colored and tarnished only to a depth of from 14 to 18 inches and that the organic matter in the filter material below one foot was nearly constant.

The author also gave evidence that filters in Somersetshire showed similar results when their upper layers, which were composed of clinkers varying in size from 3-4-inch to 1-2-inch, were replaced with a layer of fine granite chippings. Part of the filter was thus altered and part not. The improved quality of the effluent from the altered section of the filter at a depth of 3 ft. compared with those from same section and the unaltered section at a depth of 4.5 ft., is shown by numerous comparative analyses.

CHEMICAL AND BIOLOGICAL SURVEY OF THE WATERS OF ILLINOIS. Published by University of Illinois, Urbana, Ill.

This pamphlet gives analyses and method of analysis of the waters of Illinois, showing their chemical and bacteriological character from a sanitary standpoint.

WATER FILTER OF THE JACOB TOME INSTITUTE.* Formerly the water supply was from a reservoir fed partly by springs, partly by surface water. This mixed supply, although filtered, developed disagreeable odors and tastes after being in use over 3 years. Lately the spring water has been collected separately and mixed with the reservoir water directly before filtration. A new filter plant has been constructed after designs by James H. Fuertes.

The water is treated by double filtration, with double aeration before filtration and single aeration between the two sets of filters. The unfiltered reservoir water is often devoid of oxygen while the spring water contains 40 parts of carbon dioxide per million. The effluents show a fair percentage of dissolved oxygen, are free from odor, and show high bacterial efficiency.

REMOVAL OF IRON FROM THE WATER SUPPLY AT READING, MASS.† The water from the filter gallery contains varying proportions of iron and organic matter, depending upon varying local conditions. Simple aeration, subsidence and filtration fail to purify the water. Experiments were undertaken to demonstrate the feasibility of removing the iron by treatment with metallic iron in various forms, followed by subsidence and filtration,

*Eng. Record, 54, 572.
†Eng. Record, 54, 601.

with and without aeration. Of the method used for adding metallic iron to the water, the electrolytic method, using iron plates and a low potential current, was found to be the most practicable. The method by direct contact failed at certain times. When the water was treated by this method the iron was satisfactorily removed, except during two or three short periods during the year. The process was not very economical on account of the frequent clogging of the filter. Experiments are being continued.

THE WASHINGTON TYPHOID SITUATION AND HOW THE BALTIMORE WATER DEPARTMENT HAS PROTECTED ITS SUPPLY WITHOUT FILTRATION.‡ The author notes the fact that the installation of new filters at Washington has not effected the expected reduction in typhoid fever; neither would filters, in his opinion, reduce typhoid fever in Baltimore. In spite of the fact that health authorities and ill-informed agitators have attributed the high typhoid fever death rate in Baltimore to the character of the water supply, Quick believes that such a conclusion is not warranted by the facts.

The inspection of the watershed is very rigid and is effected with the cooperation of the rural health officers. The population is only 31 to a square mile. The Department has prepared very complete maps and records of sources of pollution, which have been the basis for planning schemes for the abatement of individual pollutions, of which 530 have been secured during the past six years. Special inspection was made of typhoid fever cases on the watershed and all affected wells are closed. There are only 50 to 75 cases of typhoid on the drainage area each year.

‡A. M. Quick, Eng. News, 56, 569.

In addition to sanitary inspection, further protection is afforded by the long storage in the reservoir. This amounts to from 26 to 41 days. In Baltimore, itself, however, there are many possible sources of infection. The city is unsewered; its inhabitants recreate themselves in the counties of Maryland and Virginia where typhoid is very prevalent; thousands of men and boys bathe in the public baths using water which is virtually weak sewage; the contents of city cesspools are used to fertilize market gardens; many of the dairies are unsanitary, 100 cases being attributed to one, for example; many polluted wells remain in use although hundreds have been condemned, and notwithstanding the open sewer gutters the majority of the houses are unscreened.

For its own information the Water Department investigated the typhoid fever cases in the city, which study showed that two-thirds of the hundreds of cases were infected outside of the city, and that without attributing any of the disease to the milk, ice or vegetable supplies, three-fourths of the typhoid was attributable to some cause other than the water supply, and the milk, ice and vegetable supplies may explain the source of some of the remaining quarter of the cases.

The author does not mention that in Baltimore, as a rule, as in Washington, the servants do not live in the houses with their employers, but migrate daily to and from their often unsanitary quarters.

The experience is an illustration of what long storage, aided by good policing of the watershed, will accomplish for the protection of a city, and while filtration would undoubtedly afford better protection, the city does wisely in diverting its present attention toward the better general sanitation of the municipality.

VENTILATION OF BOSTON SUBWAY.* The author gives a very condensed statement of conditions

*By Carson, Am. Soc. Mech. Engr., 28, 50-64; also 28, 958-961.

affecting ventilation of the original Boston Subway, the East Boston Tunnel and the new Washington St. Tunnel. About 80,000,000 people use the Subway yearly. In general all the tunnels are ventilated by taking in fresh air at the stations and portals and discharging it from the traffic tubes at midway points. In the East Boston tunnel, however, provision was made to conduct the vitiated air to the shores by means of a special duct.

The carbon dioxide in the air of the Subway was found to vary between 6.53 and 9.45 parts in 10,000 volumes, samples being taken between 5.00 and 5.30 P. M. on week days in January and February. The air in the center of a car on Boylston St. about to enter the Subway contained 25 parts of carbon dioxide in 10,000 volumes and the air on the street in the central part of the city from 4.4 to 5.9 parts. Ventilation is aided by fans, and the cost is less than 1 per cent. of all costs of operation and interest.

LABORATORY NOTES.

By Frederic P. Gorham,

Associate Professor of Biology, Brown University, and Bacteriologist, Providence Health Department.

OPSONINS. "Through the researches of Wright and Douglas* it has been established that the phagocytic effect of human leucocytes upon certain bacteria is essentially dependent upon the presence in the blood plasma and serum of substances which they have termed opsonins."§

A comparison between the number of bacteria ingested

*Proc. Roy. Soc. 1903, lxxii, 357; ibid. 1904, lxxiii, 128; ibid. 135, and ibid. 147. For a complete list of the works of Wright and his associates see Wright, Lancet, 1905, 2, 1598.

§Simon, Lamar and Bispham, Jour. Experimental Medicine, 1906, viii, 651.

by the leucocytes of a given blood and the number ingested by the leucocytes of normal blood is termed the opsonic index of the blood.

Methods of determining this opsonic index are still in the experimental stage but perhaps a review of some of those thus far recommended may be of use.

The original method of Leischman† of which that of Wright and Douglas was a modification, consists in mixing equal parts of blood and bacterial suspension and placing a drop of the mixture on a slide, covering with a cover-glass, and incubating at 37°C. The slide and cover are then drawn apart and the resultant smear stained with Leischman's stain.

Wright's modification of this method was as follows: A sample of normal blood is mixed with one tenth of its volume of a ten per cent. solution of sodium citrate. The corpuscles are isolated from the plasma by repeated washings with physiological salt solution and centrifugations. The washed corpuscles are then mixed with equal parts of the serum to be tested and the bacterial suspension. The serum to be tested is obtained by allowing a sample of the blood to clot in the usual way. The bacterial suspension is made by rubbing up in physiological salt solution a portion of a twenty-four hour agar culture of the organism against which the opsonic power of the blood is to be tested. The mixture is incubated at 37°C. for fifteen minutes, smears are made and stained with Leischman's stain. Finally the number of ingested bacteria is counted in a series of polynuclear leucocytes and the average for one leucocyte is calculated. This average compared with that obtained in the case of normal bloodserum gives the opsonic index of the blood under examination.

With this Leischman-Wright method as a starting point we find the modifications becoming more numerous every

†Leischman, Brit. Med. Jour. 1902, i. 73.

day. Most of these look toward a standardization of the methods, a simplification of the technique or modifications in staining.

MacFarland and L'Engle in a paper read before the Society of American Bacteriologists at the Ann Arbor meeting* urge the importance of securing uniform suspensions of the bacteria and they described a "nephelometer" which they recommended for use in comparing different bacterial suspensions. They also recommend the use of Marino's stain for the smears.

Simon, Lamar and Bispham† in their "Contributions to the Study of the Opsonins" give a very careful outline of their method which is too long to be quoted here but which gives an idea of the most recent development of the technique.

In an article by Rosenow§ on the "Rôle of Phagocytosis in Pneumococcus Infection" we find the suggestion that the mixture of bloodserum, leucocytes, and bacteria, should be kept in motion during the period of incubation, in order to prevent them from becoming distributed unequally, and so approximating more closely *in vitro* the conditions in the circulation.

He says "I devised a small shaking machine that could be placed in the incubator. With this modification in the technique phagocytosis is perceptibly increased and the results obtained would seem more reliable because phagocytes and pneumococci are brought into closer contact. The shaking must not be too vigorous otherwise the leucocytes are broken up. About 120 to 150 vibrations per minute with a shake of three millimeters is the most satisfactory. This is just sufficient to keep the corpuscles and leucocytes equally suspended and does not break up the leucocytes."

*Science, 1906, xxiii, 218.
†Jour. Exper. Med. 1906, viii, 651.
‡Jour. Inf. Diseases, 1906, iii, 684.

BOOKS AND PAMPHLETS REVIEWED.

DIPHTHERIA—ITS PREVENTION, RESTRICTION AND SUPPRESSION.

Issued by the Illinois State Board of Health, 1906-1907.

The State Board of Health of Illinois has recently issued pamphlets bearing the above title. Similar pamphlets have also appeared on Scarlet Fever and Typhoid Fever. This literature is written in clear, concise language and is sufficiently free from technicalities as to render it easily understood by the laity for whom it is evidently intended.

The education of the people along such lines as these is a step in the right direction and the advice given is, on the whole, excellent. Particularly good is the admonition to call the physician without delay in all doubtful cases and the statements regarding the benefits of the early use of antitoxin.

It is somewhat to be regretted that the author of these pamphlets has called particular attention to sewer gas as a cause *per se* of infection, since experiments made within recent years by competent workers have shown the air from sewers to be practically free from bacteria of any kind. Were it in fact true that disagreeable odors were carriers of infection, the people themselves would take more interest to learn how best to avoid infection.

It is also our opinion that too much attention has been called to filth and its effect in lowering vital forces so that the body becomes more susceptible to disease. While this is true in a degree and while it is desirable to get rid of filth for good reasons we believe it positively harmful to so emphasize these points as to distract attention from what is the more usual channel of infection—direct contact.

TROPICAL MEDICINE, WITH SPECIAL REFERENCE TO THE WEST INDIES, CENTRAL AMERICA, HAWAII AND THE PHILIPPINES.

BY THOMAS W. JACKSON, M. D.

P. Blackiston's Sons & Co., 1907.

As our insular possessions and the Panama Canal have brought us a deeper interest in the people of the tropics, so also has the medical profession been brought in closer touch with the diseases prevalent in hot climates. As has been stated in the paper on Leprosy elsewhere in this Journal, the returning soldiers from the Philippines and the closer commercial relations with tropical lands will undoubtedly result in the importation of such tropical diseases as can gain a foothold in our climate. It is thus with a feeling of greater interest that one now opens a book on Tropical Medicine.

The author having been Asst. Surgeon for the U. S. Volunteer Troops has drawn on his own personal experiences to a considerable extent in citing cases and describing symptoms. This leads in places to a rather extensive use of the personal pronoun. While this might be objectionable to some it certainly adds a peculiar charm, making the perusal of this book more of a pleasure than a task.

The book is tastefully bound and well illustrated, but one cannot say as much for the typographical work, misspelled words being somewhat common, especially in the first part of the volume. One contradiction has been noticed:—On page 203 the statement is made that "leprosy is an exceedingly infectious and contageous disease," while on page 210 one finds that "leprosy is so feebly contageous . . . . that it might be well to abandon isolation," etc.

The author makes the point that the times of threatened invasion of plague "nothing less powerful than the national authority will be satisfactory"—since locally "there will always arise bitter protest on the part of the public, or at least a portion of the public, on the ground of interference with

commerce and the hardships and damage to the community or state." This statement recalls the effort to suppress the truth in regard to the presence of plague in San Francisco some years ago, as an opposite picture the efficient way in which the plague was stamped out by the national authorities at Mazatlan, Mexico, and is in itself a strong plea for the establishment of a national board of health in the United States with a cabinet officer at its head.

The book in general is up-to-date and will well repay careful reading.

SURGICAL SUGGESTIONS.

Practical Brevities in Surgical Diagnosis and Treatment by Walter M. Brinkner.—Surgery Publishing Co., 1906.

This little book takes up the human body part by part, giving practical suggestions presented in such a way that they will be recalled when the condition is met. Useful alike to student and practitioner. B. L. A.

PHYSICIANS VISITING LIST 1907.

P. Blackiston's Sons & Co., Phila.

This publication is undoubtedly sufficiently well known to the medical profession as to need little comment. Some systematic method of keeping records such as this book offers is practically indispensable to the busy practitioner.

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Vol. XVII. (New Series. Vol. III., No. 2.) February, 1907. No. 1

A SYNOPSIS OF THE WORK OF THE MILK COMMISSIONS OF THE UNITED STATES.

The establishment of milk commissions in the United States began practically with the new century.* Medical Societies recognizing that the heavy infant mortality among bottle-fed babies must be largely due to impure milk took this method of securing a supply which could be guaranteed as being produced from healthy herds under proper conditions and kept clean and pure throughout its progress from producer to consumer.

As public interest has gradually been drawn to impure milk and as bacteriological methods for the detection of such milk have been developed and improved, Commissions have

*A reply from the Essex County Milk Commission, Newark, N. J. was received too late to be summarized, all copy then being in the hands of the printer. The Essex County Commission was organized in 1893, and is undoubtedly the original commission. Its officers have copyrighted the term "Certified Milk," but offer it for use by any medical milk commission organized to influence dairy work for clinical purposes.

been established all over the United States, the majority within the last two or three years.

Recognizing the importance of the work of the Milk Commissions and realizing that a more general knowledge of the methods employed and the results obtained would be of interest to the readers of this Journal and it is hoped, a benefit to the Commissions, it occurred to the writer to send out a circular letter to the various commissions asking for information regarding their work.

The topical heading of the summary which follows indicates the nature of the questions asked. These questions covered not only the work of the Commissions but also asked for their opinion on various matters pertaining to pure milk.

Of 20 Commissions addressed 11 answered satisfactorily (see list on page 141) and to them are due our acknowedgements for responding promptly and fully to the questions submitted.

The Commission of the Academy of Medicine of Cincinnati has recently sent out circular letters suggesting a conference of Milk Commission delegates at Atlantic City in June at the time of the American Medical Association meeting (see page 152). Such a meeting should be productive of much good in securing uniformity of methods, in encouraging the establishment of other commissions and in furnishing for such future commissions a basis for action.

B. R. RICKARDS.

Summary of Replies.—[All replies received to the circular letter were forwarded to Dr. H. W. Hill, Associate Editor who compiled the following summary. In the list of commissions given below the name of the official giving the information,—usually the Secretary is inserted after the name of the Commission.]

The following Milk Commissions sent in replies to the questions.

The Milk Commission of the Oakland Home Club, Oakland, Cal., Dr. Sarah L. Shuey, 952 14th street, Oakland, Cal.

Cambridge Medical Improvement Society, Cambridge, Mass., Dr. Albert P. Norris, Massachusetts avenue, Cambridge.

Academy of Medicine of Cincinnati, Cincinnati, O., Otto P. Geier, M.D., 124 Garfield place, Cincinnati, O.

City of Cleveland, Cleveland, O., G. W. Moorehouse, 1110 Euclid avenue, Cleveland, O.

Syracuse Academy of Medicine, Syracuse, N. Y., Dr. A. C. Mercer, 324 Mongomery street, Syracuse.

Milwaukee Medical Society, Milwaukee, Wis., Dr. A. W. Myers.

Monroe Company Medical Society, Rochester, N. Y. (Formerly of the Rochester Academy of Medicine), Dr. G. W. Goler.

Elmira Academy of Medicine, Elmira, N. Y., Dr. C. W. M. Brown, Elmira, N. Y.

Suffolk District Medical Society, Boston, Mass., Dr. Wilder Tileston, 117 Beacon street, Boston, Mass.

Medical Society of the County of Kings, Brooklyn, N. Y., Harris Moar, M.D., 360 Park place, Brooklyn, N. Y.

Medical Society of the County of New York, New York City, N. Y., Dr. Rowland Freeman.

Several other commissions replied, but in such a manner that the information could not be used in this compilation. In one case, certification had ceased, the only dairy which had come under the supervision of the Commission having operated at a loss. In this case, the initial expenditures for the dairy, which was organized and instituted solely for the production of high grade milk, had been made on a scale too ambitious considering the available local market. This was combined with a low price (10 cents per quart) for the certified milk and resulted in failure.

Organization.—The 11 commissions reporting consisted

of committees appointed by medical societies in 8 instances, the remaining 3 by a private club; a medical society, cooperating with a business men's club; and a regular medical society, cooperating with a Homeopathic Medical Society and the Chamber of Commerce.

Funds.—Nine reported: The funds of one came from the medical society alone; two, from sale of caps alone; two from the medical societies and dairies; one from private subscriptions and sale of caps; one from a bottle tax; one from the dairymen, and one from the Health Department.

Date of Organization.—All reported: One organized in 1900; one in 1901; three in 1902; two in 1904; one in 1905; three in 1906.

Date of Beginning Operation.—Ten reported: One began operation in 1900; one in 1902; one in 1903; two in 1904; two in 1905; two in 1906; one in 1907.

Annual Cost.—Eight reported: Two stated cost as negligible or none; one reports $900 (one dairy supervised); one, $1,800 (two dairies supervised), one $4,000 (eight dairies supervised), one $3,000 (19 dairies supervised); one, cost borne by producers; one, not yet known (began operation Feb., 1907). It is evident that the answers in most cases related only to the cost to the Commission. Thus in one case reporting "none," the Health Department bore all expenses. Moreover, the cost to the Commissions did not in all cases cover total cost, inasmuch as a certain amount of the work done in some cases at least was volunteer.

Number of Dairies Supervised.—All reported: Seven supervised for certification 1 dairy each; one, 2 dairies; one, 8 dairies; one, 19 dairies; while one supervised 1 for certification, 1 for inspection; this latter commission expects soon to add two more dairies to its list.

Forms of Examination for Certification.—All reported bacteriological tests, chemical analyses and inspections as the bases of certification.

Number Samples Analyzed for Certification.—Six reported: Per dairy, one examined 12; one, 20; two, 24; one, 48, and one 50 samples annually. (One having 19 dairies, reported 52 samples examined. This probably means 52 per dairy.)

Total Output.—Two reported: One, from one dairy only, reported 365,000 quarts as annual sales. One, from two dairies, reported one dairy "certified milk" 190,000 quarts, one "inspected milk" 100,000 quarts.

Grades Recognized.—All reported: Nine concern themselves with "certified milk" only; two, with both "certified" and "inspected" milk; one of the nine, however, lends its approval to "inspected milk" supervised independently by the municipality.

Attitude of Dairies.—All reported: Four reported attitude as friendly; three, as "privately opposed," "critical," "antagonistic;" two as indifferent; two reported that those dairies concerned were friendly, implying that others were at least critical. It was not always clear from the replies whether those responding had in mind chiefly the attitude of the dairies under supervision for certification or chiefly the dairies which were not "within the fold."

Attitude of Public.—All replied: Seven reported attitude as "friendly," "appreciative," "absolute confidence," "patrons enthusiastic," etc. Two reported indifference, two did not know.

Profitable to Dairy.—All replied: Three reported flatly "yes;" two reported "yes, on a large scale," and "yes, in connection with ordinary milk;" one states that certified milk is "said to be" profitable; one that the producers have asked for a raise in price (present price in this case per quart 15 cents, per pint 8 cents to consumers, as against ordinary milk per quart 7 cents). Two report that it is too soon to say (neither of these commissions has yet run for one full year) and two state flatly that it is unprofitable. One of those

reporting that certified milk is profitable adds a note that inspected milk has not proved profitable so far.

PRICE OF CERTIFIED MILK AND ORDINARY MILK.

	To Contractors.										
	1	2	3	4	5	6	7	8	9	10	11
Ordinary Milk per Qt.	6¼	4	3¾	3–4	?	3–4	3½–4	—	—	2¾	3
Certified " " "	.....	.....	.....	.....	.....	9	.....	...	...	6*	.....

*At farm, contractor supplying container, transportation, etc.

	To Consumers.										
	1	2	3	4	5	6	7	8	9	10	11
Ordinary Milk per Qt.	9–10	8	6	7	5–6	6	8	5–6	8	6–8	8
Certified " " "	12	10	14	15	12	12	10	8	20	12	15-20
" " " Pt.	7½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

In 1 and 10 the low price is loose milk, the high is bottled.

Bacterial Samples, How Collected.—Nine reported: Four secure the original package itself (i. e. a bottle) put up by the producer; one collects in sterilized plugged test tubes from the original package, the test tubes standing in iced water in a copper case. One collects the original package or transfers the milk to a sterile glass stoppered bottle. The remaining three answers to this question were obscure.

Chemical Samples, How Collected.—Methods identical with those for the bacterial samples were followed apparently in all cases, except that where the test tube was used for the bacterial sample, an 8-ounce rubber stoppered glass bottle was used for the chemical sample.

Samples Collected By.—All reported: Three have hired agents; three collect through the Health Department or municipality; three collect directly through the chemist or bacteriologist of the commission; one through the chemist bacteriologist or secretary of the commission; one states that the bacterial samples are bought at the store, the chemical samples "left at the chemist's house" (presumably by the producer or dealer.)

Reports Made To.—Nine reply: Seven commissions receive the reports direct, or through their secretaries, one through the Health Department, and one through its inspector.

Time of Collection.—Ten report that the samples are secured at the time of delivery to the consumer; i. e. from delivery wagons, during delivery, or from consumer immediately after receipt. One reports "from stores," occasionally from "farms."

Collector's Salary.—Seven report: One, using a hired agent, pays $1.00 per sample; two, collecting through their own bacteriologist or chemist, $5.00 per sample (but this probably includes the analytical fee); two report no fee, but these collect through the bacteriologist or chemist and the analytical fee includes collection; one, collecting through the city inspector pays no fee, and one retains at annual salary (not stated) one person who collects, examines and inspects, giving whole time.

Number of Inspections of Dairies.—Seven report: Six make monthly inspections; one irregular inspections.

Temperature Limit for Milk.—All report: One, below 60 degrees F.; six, below 50 degrees F.; two, below 45 degrees F.; one below 40 degrees F.; one below 35 degrees F.

Inspections Made By.—All report: Seven employ their own veterinarian or inspector (in two of these cases, the veterinarian is also the bacteriologist and in one case, local and State authorities also make veterinary inspections); one has the services of a volunteer veterinarian; one, of the State veterinarian. Two report inspections by the commission, assisted in one instance by the Board of Health, in the other by the City Inspector.

One states inspector's salary as $90 per month for whole time. In other cases, part of the time of the inspector only is employed in inspections and the pay of those not volunteer or already on salary is made per inspection. Three only

state the payment, these giving $10.00 per visit; two adding expenses also.

Tuberculin Test Required.—All Report: All require a tuberculin test; two require annual tests of the whole herd; one semi-annually; the others state no specifications on these points. All (naturally) require tests on new cows added to the herd. One adds that $2.00 per cow is charged for the test, paid by the producer.

Chemical Tests Required.—Nine report: (For convenience in record, numbers have been used to designate the test as follows: Fats 1, tot. solids 2, specific gravity 3, acidity 4, preservatives 5, sed. 6, ash 7, proteids 8, sugar 9, solids not fat 10, color 11, temp. 12, taste 13, salts 14.)

No. 2=1 and 2.
3=1, 2, 3, 4, 5, 6.
4=1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14.
5=1, 2, 3, 4, 7, 8, 9, 12.
6=1, 3, 4, 5, 7, 8, 9.
7=1, 2, 10.
8=1, 2, 3, 5, 7, 8, 11.
9=1, 7, 8, 9.
10=1, 5, 6, 12, 13.
11=1.

Chemical Tests By.—Ten report: Seven employ part time of chemist; one secures analyses through the Municipal Milk Inspector, one through the Health Department. One has the gratuitous services of a volunteer chemist.

Fees.—Ten report: Four pay $5 per sample; one $3.50 to $5 (giving, however, no reason for the variation); one $2 per sample: where municipal officers supply the analyses, the Commissions pay no fee (two cases). One receives gratuitous services; one employs whole time of a chemist, bacteriologist-veterinarian on annual salary.

STANDARDS	1	2	3	4	5	6	7	8	9	10	11
Fat		3.7		4	4.5 3.5	4.5 3.75	3.5	4.5 3.5	*	4	4
Total Solids		13	13								
Solids not Fat			9	12			12.5	13	No St'd	12	
Sugar					4-5				4-5½		
Proteids					3.5-4	3-4					

*1st grade 3.5–4.5 2nd grade over 4.5

Bacterial and Microscopic Tests.—Ten reported: Ten make counts: three examine also for pus; one each examines for gas producers, liquifiers and pathogens; one of these also for blood and streptococci. Four report the medium used, one each using 3 per cent. lactose agar, litmus lactose agar, gelatin-agar and plain 1 per cent. agar. The time and temperature of incubation varies for those reporting. Evidently much requires to be done before this most important part of certification can be considered to be on a definite basis.

Bacterial and Microscopic Tests By.—All report engagement of bacteriologists same as for chemists (see above) with similar fees, except that where the chemist's fee is reported as $3.50 to $5, the bacteriologist's fee is $4.

Bacterial Count Standards.—All report: Nine set limit of 10,000 without qualification for certified milk. One has a winter limit of 10,000, summer limit of 20,000. One of the nine above referred to has also a limit for certified *cream* of 25,000. The Commission which supervises inspected milk as well as certified, limits the former to 60,000 in winter, 100,000 in summer. One requires for certified milk an "average of less than 30,000."

Caps.—All report: Ten use pasteboard caps, six in com-

bination with paraffin, the remaining four using one a parchment ring on neck, one a tin cover, wired to neck, one a tinfoil cover, one waxed paper. Of the six using paraffined pasteboard, one adds a tinfoil cover, one a metal and lead seal, two parchment covers. The tenth commission permits any good method involving double caps. Six apply the caps by hand, one (tin cover wired and sealed) by machine and three do not report on this point.

Opinions, Etc., Concerning Milk Depots.—Five responded: One approved of milk depots; two specified that they should be municipal; two that they should not be municipal and one stating that they should be under a commission. Four believed the educational value very considerable. Only one reported cost of milk depot giving $725 annually, divided into salaries, $500; equipment, etc., $150; rent, $75; this depot sells at 8 cents per quart.

Concerning Pasteurization.—Seven responded: All flatly against commercial pasteurization, two adding that commercial pasteurization had generally proved itself a failure.

Concerning Effect of Commercial Pasteurization on Regulations Relating to Bacterial Counts.—Six responded: Two believing it would have no effect. The question was obviously not wholly understood.

What Shops Should Sell Milk.—Six responded: Four specified merely "clean" or "sanitary" shops; two would restrict the sale to shops for milk products alone. It was suggested that regulations made for milk shops should relate to equable mixing: cleanliness, use of bottles, and low temperature.

Opinions Concerning Municipal Milk Stations.—Five responded: Two approved, two condemned, and one approved, but "not at present time."

Legislation Most Needed.—Four responded: Protection of the term "certified" as applied to milk; a general bacterial limit of 500,000 bacteria per cc.; preventing bottling

of milk from delivery wagons on street; tuberculin test; temperature limit of 50 deg. F. for milk; a general bacterial limit of 100,000 bacteria per c.c.; and state inspection of dairies, with state action against tuberculosis in cattle, were suggested.

Is the Term Certified Milk Protected Legally?—Ten responded: Four stated that it was not protected in either municipality or state; three, that it was protected in the state; three, that it was copyrighted. The protection other than copyright consisted in one case of a law against falsely using the caps of certified milk bottles; in the other, of a law that certified milk must bear the certification of a county medical society, organized under the state medical society.

Is General Inspection by a Central Authority Advisable?—Six responded: Three, yes; one, yes, but not now; one, no, suggesting that the authorities of the municipalities whose jurisdiction overlapped should agree to delimit the areas amongst themselves. One thought that the state and the cities concerned should do this work.

The Scope of Milk Commissions.—Eight responded: One stated that the true function of a milk commission was to bring together the best city trade and the best producers, and to make clear to the former the worth and care taken by the latter. All the remaining agreed that certification was the proper duty of the commission. General improvement of the supply was regarded by two as a function, but by two as only an incidental; two stated that general improvement was not yet a function, while one stated that it was a municipal function, not a commission function. The operation of milk depots was considered in four replies only, one stating that it should be a state, the second a municipal, and the third a milk commission enterprise, the fourth merely answering "no." The popularization of clean milk was accepted in nine replies as properly within a milk commission's scope.

In considering the status as shown in the above tables of milk commissions' work in the supervision of dairies attempting to produce "certified milk," anyone must at once be struck by: 1st—The amount of work and thought gratuitously given by the milk commissions for the purely altruistic purpose of benefiting the health of the community; 2nd—The large percentage of commissions organized wholly by physicians; 3rd—The encouraging fact that co-operation with business men and with private individuals has been secured in some instances at least; 4th—The peculiar difficulties which altruistic bodies of this character meet in endeavoring to achieve as a main object that improvement of milk desired, and at the same time to satisfy the unaltruistic business instincts of the milk dealer and of the consumer, to each of which the sanitary quality of the milk is too often an incident rather than an end; 5th—The fact that, notwithstanding the apparent impossibility from an *a priori* standpoint of achieving anything, the milk commissions as a rule have achieved success in most, and unqualified success in some, cases; 6th—The wide variations in the expense to the commissions of certification, including analyses and inspection of dairies; 7th—The wide variations in the methods used in the basic analysis, i. e., the bacterial count. While the bacterial standard numerically is pretty generally accepted as 10,000 per cc. on delivery to the consumer, the variability of the techniques reported in the above tables in determining the count in individual cases is so great that in fact the standard varies in different places. For instance, if one medium and set of conditions are used in one place for determining the bacterial count, a 10,000 limit being set, and in another place the medium and conditions accepted are sufficiently different from these to give a count only half as high from the same sample, obviously the latter place, if nominally working to a 10,000 limit, is actually working on a 20,000

limit, *as compared with the first place.* Or, conversely, the first place is working on a 5000 limit, if the second place be taken as the standard. The peculiarity of this instance of lack of uniformity is that it is permitted to exist and to continue not in the non-essential but in the case of the *basic standard* on which the whole movement for sanitary milk is founded.

As has been pointed out many times heretofore, the chemical tests, which have been worked out to near perfection in the course of many years experience in many laboratories, are so closely uniform as to permit comparison of the results in one community with those in other communities. But the chemical analysis supplies merely the anatomy of the milk. Its physiology, so to speak, its ability to act as a suitable nutriment, while based of course upon its anatomy, is really decided by the bacterial test. The chemist decides mechanically the bald ratios of the various necessary ingredients constituting the milk. The bacterial tests decide whether the milk itself as a unit is fit for consumption. The chemical test decides if the cows are giving sufficiently rich milk in the first place, and if the producer or handler has added to or substracted from the original product. His tests affect the question of whether or not the consumer is getting full value for his money, in fat, sugar, etc. The bacteriologist decides whether the mixture of fat, sugar, etc., has been so produced and cared for as to furnish a sanitary article of diet.

8th—The uniformity of the opposition to pasteurization is striking, as well as the variety of ideas stated in reply to other questions.

9th—In the details of bottling, caps, seals, etc., great variation is found, but uniformity in these is not so essential as in certain other matters.

We cannot forbear to publish here the circular letter of the Milk Commission of the Academy of Medicine of Cin-

cinnati, kindly forwarded to us by the secretary. The purpose of such a meeting of milk commission delegates is an excellent one and should result in unifying, simplifying and making more easy the operation of those in existence and the inauguration of new ones. It does not seem that such a meeting could well decide upon the technical details of the bacterial examinations, however.

(Circular letter of Milk Commission of the Academy of Medicine, Cincinnati.)

Gentlemen:

Ever since the organization of this Commission, we have been making a rather exhaustive inquiry into the workings of the various Milk Commissions throughout the country. Our circular letter of detailed inquiry has met with a hearty response on the part of the various commissions and these tabulations assisted us very materially towards a prompt and proper organization.

The fact stands out most strongly, however, that a great lack of uniformity exists as to the character of organization; method of supervision; chemical and bacteriological standards (qualitative as well as quantitative); and the necessary technique; the appointment of experts; the relation of veterinarians to Commissions in the testing of herds, etc.

A very great diversity of opinion is shown as to the methods of bottling, capping and sealing of bottles; the pros and cons of the milking machine; obtainable results; hospital milks, etc. An equal variance is shown likewise in the cost of certification to the dairymen.

Our correspondence brings out the pleasing fact that the men who are doing this work are enthusiastic in their efforts for clean milk in our large cities and that they will not rest satisfied with the certification of a limited supply of milk. It

would seem possible to extend their influence and that a concerted effort on the part of all Milk Commissions would do much towards solving this most serious problem of raising the quality of the general supply.

It appears to us therefore, that a meeting of all Milk Commissions of the country for the discussion of the various phases of their work, the interchange of views, and the possible end of forming a national organization, would be productive of very excellent results.

A general standardization of our individual standards would result and we would be in a far better position to present the problem to the profession and laity in a more definite and practical form. Not the least good that might be accomplished by such conference would be to place within the reach of any medical society, considering the formation of a Milk Commission, a simple and well-defined plan of procedure.

While we would be delighted to have such a meeting held at Cincinnati, should such a plan prove feasible, a conference called at Atlantic City during the coming meeting of the American Medical Association in June, might be much more largely attended and results correspondingly better.

We are now communicating with the various commissions of the country and would ask you first, what you think of the plan, second, whether your commission would send accredited representatives to such a meeting, and finally, what your suggestions would be as to the best time and place for such a meeting.

(*Signed*) Yours truly,

The Milk Commission of the Academy of Medicine.

OTTO P. GEIER, M.D.,

Secretary.

The Laboratory Section of the American Public Health Association appointed one and one-half years ago a committee to standardize bacteriological and microscopical milk methods. Reorganization was effected at the December meeting, 1906, and the committee now consists of Prof. H. L. Russell, Dean of the Agricultural College, Wisconsin, Chairman; Dr. F. H. Slack, of the Boston Board of Health Laboratory; Dr. W. H. Park, of the New York Board of Health; Dr. E. C. Levy, Health Officer, Richmond, Va.; Prof. C. E. Marshall, Michigan Agricultural College, and Prof. F. C. Harrison, McGill University, Montreal.

This committee is now actively engaged in the technical procedures and standards which should be followed and will report at Atlantic City at the meeting of the American Public Health Association in September.

H. W. HILL.

THE REORGANIZATION OF THE DEPARTMENT OF PUBLIC HEALTH AND CHARITIES OF THE CITY OF INDIANAPOLIS.

The organization of the Department of Public Health and Charities of the city of Indianapolis, as it is at present conducted, consists of three Health Commissioners and a Secretary who is the Health Officer and Executive Officer of the Board, a chief clerk of Vital Statistics, with three assistants, a telephone operator, and a stenographer.

During the last Legislative session, a law was passed increasing the Board to four members, not more than two of whom shall be of the same political party and rotating their time of service so that in event of a political change of administration, the incoming Mayor can only appoint one member during his term of office. The Secretary of the

Board, the Superintendent of the City Hospital, and the Superintendent of the free Dispensary can be removed for cause only, and upon a trial being given by the Board.

This law takes the Department of Public Health out of politics, a condition very necessary to the proper conduct of such an important branch of municipal administration. The law goes into effect June 1, 1907.

The sanitary department maintains fully-equipped laboratories, both Chemical and Bacteriological, each in charge of competent persons. The city has been divided into ten sanitary districts, each in charge of a sanitary inspector. These inspectors are required to wear a uniform which consists of a blue sack coat with plain brass buttons, trousers to match, a police sergeant's cap with a shield having upon it the words "Sanitary Inspector" and the number of the inspector. They have police powers and wear a regular badge.

The roll is called at 8 A. M. and 5 P. M. each day, and each hour during the day the inspectors must call the Department by telephone from their respective districts, for orders, the telephone operator noting the time of such calls upon a special form. Each district has a complaint book in which complaints are entered as reported and given to the inspector when he calls by 'phone. A supply of quarantine cards, etc., is kept in each district so that it is not necessary for the inspector to return to the Department except at the close of day for roll call. The inspectors serve thirty days in a district and then change. This equalizes the work, as in some of the districts the work is heavier than others.

In addition to these inspectors, we have two milk and dairy inspectors, a food and assistant food inspector who are veterinarians and a disinfecting corps. We have found that since we have established the force on a semi-military basis, the duties are better and more quickly performed; and, as each inspector is judged by the number of complaints com-

ing from his district, he naturally tries to make as good a showing as possible.

EUGENE BUEHLER, M. D.

Indianapolis.

PRESENT STATUS OF MORPHOLOGICAL TYPES OF *B. DIPHTHERIAE.*

So many requests have been received by the American Journal of Public Hygiene for reprints of the Report of the Committee on Diphtheria Bacilli in Well Persons (this journal, July, 1902) or other material which figure Wesbrook's types of *B. diphtheriae*, that we have decided to reproduce the plates accompanying the report together with the summary tables (P. 96 and 97 of July, 1902), in actual figures and in percentages. Dr. Wesbrook has very courteously waived any objections which he might have to this forestalling of further reproduction of the plates elsewhere. The difficulty of securing accurate reproduction of the varying and variable tints of the actual colors has resulted in a decision to print in black and white only, indicating the coloring in footnotes.

Since some unwarranted confusion arose at the date of original publication ("Varieties of *B. diphtheriae*," Wesbrook, Wilson & McDaniel, Trans. Association American Physicians, 1900) concerning the exact nature of the original claims as to the significance of these types, it is well to re-state now the statements then made to the effect that the types figured were drawn up and designated in order to supply a definite and fairly exhaustive morphological nomenclature for the numerous and confusing variants of *B. diphtheriae* constantly found in cultures, for which theretofore incomplete and clumsy descriptions only had existed.

It must be understood that the figures given are types and types only. Just as the types of human faces may be divided into Caucasian, Negroid, Mongolian, etc., and these again subdivided, so the morphological types of diphtheria bacilli may be divided and subdivided.

The original publication of these types resulted in an immense advance in the practice of the bacteriological diagnosis of diphtheria because bacteriologists, provided with a definite nomenclature and a standard set of figures representing the types, were able to compare results with an accuracy before impossible. The discussion precipitated by this publication resulted in renewed investigations, of which that of the Committee of the Massachusetts Association Boards of Health on Diphtheria Bacilli in Well Persons was perhaps the most extensive co-operative investigation ever made on the subject. As a result of these investigations the dictum was reached that the types A, C and D were those on which alone a diagnosis of diphtheria could be safely based, notwithstanding that other types may be occasionally isolated in a virulent condition. In other words, a report of "positive," in ordinary practice, should rarely be given from the microscopic examination of nose or throat cultures on Loeffler's blood serum, incubated at 37 degrees C. for 12 to 24 hours, and stained with Loeffler's methylene blue unless A, C or D, irrespective of associated types, be found present.

The practice as formulated in the Boston Board of Health Laboratory during the years 1900 to 1903 and since followed with marked success may be thus summarized:

1. Diphtheria bacilli reported *present* means that types A, C or D were found, irrespective of presence or absence of associated types.

2. Diphtheria bacilli reported *absent* means absence of A, C or D; and of A1, A2, B1, B2, C1, C2, and E; but irrespective of presence or absence of remaining types.

3. *Atypical* organisms reported *present,* accompanied by request for another culture (i. e., a "doubtful" diagnosis) means that A1, A2, B1, B2, C1, C2, or E were found, but not A, C or D: and irrespective of the presence or absence of the remaining types.

It is to be noted that this formulation was intended simply as a translation of the known facts concerning diphtheria bacilli into terms suitable for the routine cultural diagnosis of diphtheria. It was not intended that the types from E1 to G2 should be excluded from the term diphtheria bacilli in the botanical or systematic sense. Indeed, conclusive proof has been furnished by Wesbrook, Wilson and McDaniel that these types are to be found associated with the larger forms in almost all pure cultures of virulent diphtheria bacilli; and their development from and into the larger forms has been traced and figured in the Boston Board of Health Laboratory by actual continuous microscopic observations of individuals in the process of growth. These smaller types, when found unaccompanied by A, C or D, under the conditions of the regular routine cultural diagnostic service, can and should be disregarded, however, since experience has shown that the rare error so introduced is practically negligible, while if reported as diphtheria bacilli, because of their botanical relationships or because very exceptionally such forms may be virulent, the enormous error introduced daily in actual practice would eliminate cultural diphtheria diagnosis from the list of practical diagnostic utilities. In our judgment it is better occasionally (once or twice a year) to report negative on a culture from a positive case, as may result from following the above rulings, than to report daily a large percentage of positive results on cultures from negative cases, as will inevitably follow the recognition of the minor types as significant.

It is worth while perhaps also to note the Boston Lab-

oratory rulings as to the significance of A, C and D when reported present. Diphtheria is a disease, and if the person showing A, C or D is *well*, they have no disease, and therefore no diphtheria. On the other hand, while it is possible that a patient having a sore htroat, and showing also A, C and D, may not be suffering from the action of the diphtheria bacilli found, but from the action of some associated organisms, such as may produce sore throats in the absence of diphtheria bacilli, yet experience shows that the combination of sore throat and diphtheria bacilli almost invariably means that the disease of diphtheria is present; and that the burden of proof rests with those who would show, in any given case, that such evidence should not be treated as conclusive. Hence in practice, the finding of A, C or D disease of diphtheria as well as infection, while the finding in a culture from a sore throat (or nose) predicates the of these same types in a really well person proves infection only. In such cases the infected person may or may not develop the disease later.

Summary.

1. The disease, diphtheria, is a localized infection with systemic poisoning, due to the toxins of a specific bacterium, *B. diphtheriae.*

2. In a majority of cases, the peculiarities and history of the local lesion combined with the peculiarities and history of the systemic poisoning, permit a *post facto* diagnosis of diphtheria on clinical grounds alone, and form a full resumé of the completed case. Such a diagnosis would be of little value in practice, from the therapeutic standpoint.

3. In certain typical cases, a fairly definite diagnosis may be made from incompletely developed symptoms, local and systemic, on clinical grounds alone.

4. In light cases or the early stages of many severe

cases, a diagnosis of any degree of finality is usually impossible.

5. In certain severe cases of infection by other bacteria, resemblances in the clinical symptoms to those yielded by certain clinical types of diphtheria prevent a conclusive clinical diagnosis.

6. Since diphtheria is due to the diphtheria bacillus, it is natural and proper to determine the presence or absence of this organism in all cases of light or early, or severe atypical cases, not alone for the sake of diagnosis but as an indication also of the protective measures which should be taken both for the patient and for the patient's associates.

7. The established cultural method of searching for diphtheria bacilli furnishes the best known procedure for such purposes.

8. The findings must be interpreted in consonance with all that is known of the disease and of the bacterium in question. Rule of thumb interpretation will give rule of thumb results only.

9. To interpret a bacteriologist's report, if "diphtheria bacilli" are recorded as present, it is necessary to know if the term diphtheria bacilli be used to include all (or certain) merely botanical members of the diphtheroid group, or is restricted to those of significance in diagnosis (A, C or D).

10. If A, C or D be found together with local lesions, it is proper to assume that the symptoms, local and systemic, that the patient presents are due at least *in part* to these types, and that treatment and precautions should be taken as for an established case of diphtheria.

11. If the types A, C or D with or without the doubtful or negative types are not found on the first examination, it is to be remembered that human agencies are always liable to error, and if the clinical conditions justifying the first culture continue or develop, a second culture should be

TABLE I.

SHOWING PERSONS INFECTED WITH A, C, D ("TYPICAL *B. diphtheriæ*").

	Ontario.	Newton, Mass.	Willard State Hospital, N.Y.	Brookline, Mass.	Springfield, Mass.	Washington, D.C.	Lowell, Mass.	Waltham, Mass.	Providence, R.I.	Boston, Mass.	TOTAL IN EAST.	MINNESOTA. Bethany Hospital.	Old Ladies' Home.	Owatonna.	Red Wing.	Catholic Orphan Asylum.	Park Rapids School.	TOTAL IN MINNESOTA.	GRAND TOTAL.
Nose only.																			
A	0	0	0	0	0	0	0	0	2	2	4	1	0	1	0	0	1	3	7
C	0	0	0	0	0	0	0	0	2	2	4	0	1	1	0	0	0	2	6
D	0	0	0	2	0	0	1	1	0	8	12	6	0	2	0	0	6	14	26
A, C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
A, D	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	2	3
C, D	0	0	0	1	0	0	1	1	0	1	4	2	0	3	2	1	2	9	13
A, C, D	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	3	6
Total nose only	0	0	2	1	0	0	2	2	4	13	24	11	3	6	5	1	11	37	61
Throat only.																			
A	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	3
C	0	0	0	0	0	0	1	0	0	2	3	0	0	0	0	0	0	0	3
D	0	0	0	0	0	0	1	0	0	2	3	1	0	0	3	1	2	8	11
A, C	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1
A, D	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	1	0	1	3
C, D	0	0	1	0	0	0	0	0	0	1	2	2	0	2	1	0	0	5	7
A, C, D	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	0	2	7	7
Total throat only	0	0	1	1	0	2	0	0	0	10	14	4	2	3	6	1	5	21	35
Nose and Throat.																			
A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0	0	0	2	3
D	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	3
A, C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A, D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C, D	0	0	0	0	0	0	0	0	0	0	0	4	0	1	3	0	0	8	8
A, C, D	0	0	0	1	0	0	0	0	0	0	1	2	0	1	1	0	1	5	13
Total nose and throat	0	0	0	1	0	0	0	0	0	4	5	6	0	4	11	0	1	22	27
Grand total (A, C, D)	0	0	3	3	0	2	2	2	4	27*	43	21	5	13	22	2	17	80	123
Reported positive	0	0	3	3	3	50*	3	3	84*	9					not	given			
Total persons examined,	50	63	82	129	185	221	250	297	927	892	3,096	102	42	247	382	65	316	1,154	4,250

*The Providence results show particularly well how varied the numbers reported as "positive" may be according to the types regarded as important. Thus on the bases of the committee's belief that A, C, D, should be considered chiefly or solely, Providence, would show .43% positives. If all granular and barred but not solid forms be included, as Professor Gorham, of Providence, states there would be about 4% positives. If all forms be included, there would be about 25%. The number actually reported makes about 9%. In Washington the positives formed .9% on the committee's standard; but 22% were actually reported positive. In Boston, on the committee's standard, 3.02% were positive; but only 1% were so reported.

TABLE II.

SHOWING PERCENTAGES OF PERSONS INFECTED WITH A, C, D ("TYPICAL *B. Diphtheriæ*.")

	Ontario.	Newton, Mass.	Willard State Hospital, N.Y.	Brookline, Mass.	Springfield, Mass.	Washington, D.C.	Lowell, Mass.	Waltham, Mass.	Providence, R.I.	Boston, Mass.	TOTAL IN EAST.	MINNESOTA. Bethany Hospital.	Old Ladies' Home.	Owatonna.	Red Wing.	Catholic Orphan Asylum.	Park Rapids.	TOTAL IN MINNESOTA.	GRAND TOTAL.
Persons examined	50	63	82	129*	185	221	250	297	927	892*	3,096	102	42	247	382	65	316	1,154	4,250
Percentage of total persons infected	0	0	3.66	2.32	0	0.90	0.80	0.67	0.43	3.02	1.39	20.59	11.90	5.26	5.76	3.07	5.38	6.93	2.89
Percentage of persons showing nose only infected	0	0	2.44	0.77	0	0	0.80	0.67	0.43	1.45	.77	10.78	7.14	2.02	1.30	1.53	3.48	3.20	1.43
Percentage throat only infected	0	0	1.22	0.77	0	0.90	0	0	0	1.12	.45	3.92	4.76	1.01	1.59	1.53	1.58	1.82	0.82
Percentage both nose and throat infected	0	0	0	0.77	0	0	0	0	0	0.45	.16	5.88	0	2.23	2.87	0	0.32	1.90	0.63
Percentage of persons showing nose infected with or without concurrent throat infection	0	0	2.44	1.54	0	0	0.80	0.67	0.43	1.90	.93	16.66	7.14	4.25	4.17	1.53	3.80	5.11	2.07
Percentage of persons showing throat infection with or without concurrent nose infection	0	0	1.22	1.54	0	0.90	0	0	0	1.57	.61	9.80	4.76	3.24	4.46	1.53	1.90	3.72	1.46
Percentage reported positive	0	0	3.66	2.32	1.62	22.6	1.20	1.00	9.06	1.01					not given				

*Some cases examined in Boston, Brookline and New York were omitted from this table because of certain omissions in their records.

The records permit, however, their addition here, which would make the percentage as follows:—

Boston: total examined (nose and throat, including 892 given above), 991; total infected (A, C, D), 2.82%; nose only, 1.41%; throat only, 1.01%; both, 0.41%; total persons with nose infected, 1.81%; total persons with throat infected, 1.41%; total reported positive, 10=1.01%.

Brookline (exclusive of 129 given above): nose and throat culture in same tube, 687; total infected (A, C, D), 32=5.47%; throat only examined, 253; total infected (A, C, D), 6=2.37%. All infected with A, C, D, were reported positive.

New York: throat only examined, 200; total infected (A, C, D), 13=6.5%. All infected with A, C, D, were reported positive.

The persons examined, as recorded above in the Willard State Hospital, and those given in the foot-note in Brooklyn and New York, as well as all except the Catholic Orphan Asylum in Minnesota, had been more or less exposed to diphtheria.

PLATE I.

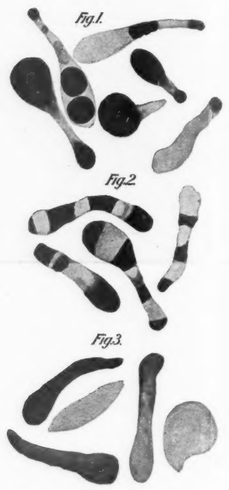

FIG. 1. Type A. 1 to 2 μ thick, 3 to 6 μ long.
FIG. 2. Type A¹. 1 to 2 μ thick, 3 to 6 μ long.
FIG. 3. Type A². 1 to 2 μ thick, 3 to 6 μ long.

The granules in A (Fig 1) are reddish.

(This and the following plates represent, in black and white, *B. diphtheriæ* from serum cultures, twelve to twenty-four hours old, stained with Loeffler's methylene blue. The reddish tint of the granules in types A, C, D, E, F, and G, noted under their respective figures, is an example of the metachromatism, well known as occurring in *B. diphtheriæ*, and certain other bacterial species. The plates are here reproduced, with the courteous permission of Dr. Wesbrook, from his original colored drawings. Colored reproductions are given in the Trans. Amer. Phys. 1900 and the Report of the Minnesota State Board of Health, 1899-1900.)

PLATE II.

FIG. 1. Type B. 0.5 μ thick, 3 to 7 μ long.
FIG. 2. Type B¹. 0.5 μ thick, 3 to 7 μ long.
FIG. 3. Type B². 0.5 μ thick, 3 to 7 μ long.

The granules in B (Fig 1) are dark blue.

PLATE III.

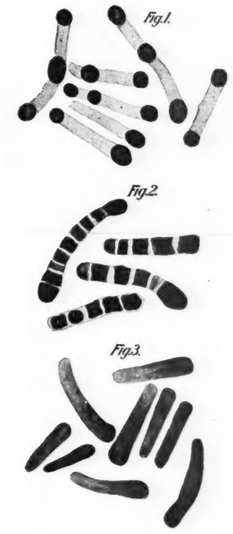

FIG. 1. Type C. 0.5 to 1 μ thick, 3 to 6 μ long.
FIG. 2. Type C¹. 0.5 to 1 μ thick, 3 to 6 μ long.
FIG. 3. Type C². 0.5 to 1 μ thick, 3 to 4 μ long.

The granules in C (Fig. 1) are reddish.

PLATE IV.

FIG. 1. Type D. 0.75 to 1 μ thick, 2 to 3 μ long.
FIG. 2. Type D¹. 0.5 to 1 μ thick, 2 to 3 μ long.
FIG. 3. Type D². 0.75 to 1 μ thick, 1 to 2.5 μ long.

The granules in D (Fig. 1) are reddish.

PLATE V.

FIG. 1. Type E. 0.5 to 0.75 μ thick, 1.5 μ long.
FIG. 2. Type E¹. 0.5 to 0.75 μ thick, 1.5 to 2 μ long
FIG. 3. Type E². 0.5 to 0.75 μ thick, 1 to 2 μ long.

The granules in E (Fig. 1) are reddish.

PLATE VI.

FIG. 1. Type F. 0.25 to 0.5 μ thick, 1 to 2 μ long.
FIG. 2. Type F². 0.25 μ thick, 1 to 2 μ long.
FIG. 3. Type G. 0.5 to 0.75 μ thick, 1 to 1.5 μ long
FIG. 4. Type G². 0.5 to 0.75 μ thick, 1 to 1.25 μ long.

The granules in F (Fig. 1) and G (Fig. 3) are reddish.

taken, perhaps a third or fourth, until it becomes obvious that the significant types are really not present.

12. Should the doubtful or usually negative types only (i. e., those other than A, C or D) be persistently present in a clearly marked clinical case of diphtheria, the case must be considered diphtheria due to a quite unusual, but not unknown, existence of virulence in these types.

13. Should the continued absence of all types be demonstrated conclusively, the disease, however closely resembling diphtheria, must be set down as not diphtheria.

14. In any case of sore throat, occurring where the prevalence of diphtheria or known exposure suggests the likelihood of diphtheria infection, antitoxin should be used and the patient isolated, pending the bacteriological investigation.

15. Should significant types or "doubtful" types be found in the throat of a well person exposed to infection, the person should be kept under observation and not allowed to expose other persons in public assemblies to infection nor to handle food or drink for public consumption.

16. Should significant or doubtful types be found in well persons known not to have been exposed to infection, they should be warned concerning the possible later development of the disease and concerning the possibility of infecting others, but restrictions can hardly be justified except in the case of milkmen, or others, placed in analogous relations to public food or drink supplies.

Description of Types.

The types are based upon microscopic examination of smears, stained with Loeffler's methylene blue made from cultures grown upon Loeffler's serum, incubated 12 to 24 hours at 37 degrees C.

Seven primary divisions, based on *size* and *shape*, are

recognized. Each primary division is further subdivided into three, based on staining reactions to Loeffler's methylene blue. The plain letters A to G are used for the first subdivision in the respective primary division; A1 to G1 for the second, and A2 to G2 for the third, making 21 individual types in all. The branching type is provisionally placed under A, but not figured in the plates. The system of primary division is based on size, inasmuch as either diameter or length or both progressively diminish from A to G, but shape correlates also with this, and over-rules mere size in classification to some extent. The system of secondary division is based on the reaction between certain portions of the protoplasm with the stain used. Thus the plain letter divisions are all stained uniformly but for the presence of certain more densely stained round or oval granules, approximating the diameter of the cell in which they lie, and, except in one division (B), showing a distinct reddish or purplish tint, in contrast with the blue of the rest of the organism. The second subdivision, designated A1-G1, show alternate bars of light and dark stain placed transversely across the length of the cell, while the third subdivision (A2-G2) are stained uniformly throughout, except that the last four have a single colorless band across the middle. (Note,—F1 and G1 not figured in the plates originally published have since been found in the Minnesota State Board of Health Laboratory.)

The present status of opinion and practice amongst American bacteriologists classes A, C and D as "significant" types, A1, A2, B1, B2, C1, C2, and E as "doubtful," and E1, E2, F, F1, F2, G, G1, and G2 as negligible types, in routine cultural diagnostic work.

H. W. HILL.

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APRIL QUARTERLY MEETING OF THE

Massachusetts Association of Boards of Health.

The quarterly meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boylston street, Boston, on Thursday, April 25, 1907, under the Presidency of Dr. Henry P. Walcott.

The reading of the minutes of the January meeting was dispensed with.

The following gentlemen were unanimously elected members of the Association, upon the recommendation of the Executive Committee:

W. A. Graustein, of the Boston Dairy Company.
Dr. Monahan, of the Clinton Board of Health.
Dr. Leon A. Paquin, of the Webster Board of Health.
William M. Campbell, of the Boston Board of Health.

THE PRESIDENT: The first business of the Association will be the paper upon "Pasteurization of Milk," by Dr Lederle, Ph.D., of New York. I now have the pleasure of presenting him to you.

PASTEURIZATION OF MILK

By Ernst J. Lederle, Ph.D.

To ensure the public a pure and safe milk supply should be regarded as one of the most important duties of the health officer, especially in the case of the larger cities.

With the growth of cities the problem becomes more and more complicated. Take New York as an illustration. It is not so very many years ago that its milk supply was derived from near-by farming districts, when a railroad haul of 100 miles was unusual. Today much of the supply comes from points 400 miles distant. It is produced on 35,000 farms, scattered through five different states, passes through 400 creameries and over twelve different lines of transportation. Some of the milk at certain seasons reaches the city from Canada, and shipments of cream arrive daily from Ohio.

One hundred and fifty wholesale dealers are engaged in the business, the retail stores number 12,000 and the daily consumption is 1,500,000 quarts. It is difficult to conceive how an effective official control can be exercised under these conditions at any cost.

In no other city is the problem so complicated, not only on account of its magnitude, but owing to the many sources of supply outside of city or even state jurisdiction.

The first extensive public agitation on the milk question in New York was directed against so-called "swill milk," a protest against the use of improper food for milch cows. Later, when adulteration by the addition of water or the removal of cream, or both, became so prevalent, vigorous and effective crusades were made by the authorities, and these forms of adulteration have been kept in check quite effectually.

Previous to the year 1901 the activities of the New York City Health Department were directed exclusively to the

prevention of adulteration of milk, no particular attention being given to cleanliness, bacterial contents, sanitary condition surrounding the production of the article, its transportation or the condition of the retail stores.

Physicians were then becoming more and more impressed with the necessity of fresh, clean milk and of a low bacteria count for successful infant feeding. Such milk was not yet a commercial product. It could be obtained from a few private dairies only, at a high price and as so-called "certified milk," and was supplied in the form of pasteurized milk by charitable associations, otherwise it was out of reach of the poor of the city.

Dr. W. H. Park, Bacteriologist of the Department of Health, at the request of Dr. Biggs, the Medical Officer, began an investigation of the condition of the milk supply from the bacteriological standpoint, with a view of preventing the excessive and unnecessary bacterial contamination; at the same time, through funds supplied by the Rockefeller Institute for Medical Research, physicians were appointed to determine the influence on the health of infants of the bacteria and their products in commercial milk.

This work also included an investigation at the source of production. The value of this research, which lasted about two years, cannot be over-estimated.

Briefly, the conclusions were as follows:

That the average commercial milk of the city was not a safe food for infants, on account of the very large number of bacteria contained therein.

The principal reasons for this unsatisfactory condition were found to be:

Filthy barns.

Unclean cows.

Improperly cleaned utensils.

Improper cooling of milk at farm.

Long transportation with insufficient ice.

High temperature at which the milk was kept in the retail stores.

While bacteria contaminate milk from the sources described, and increase to enormous numbers under such conditions, causing rapid deterioration of the product, milk is also subject to infection by germs of diseases of which the following are the most common:

Typhoid fever, scarlet fever, tuberculosis and diphtheria.

That this constitutes a real public danger will hardly be questioned. Park says in this connection:

"Every year epidemics occur which have been traced to milk contaminated by ignorant or careless milkmen, who have infected their milk from their own dirty hands or dirty water, or in other careless ways. The extent of this danger may be judged by the fact that there was published in one of the medical journals a report upon 330 outbreaks of epidemic diseases traced to milk; 195 of these were epidemics of typhoid fever, in 147 of which the disease prevailed at the dairy or farm; in 67 it was due to contamination of well water; in 24 employees at the farm were acting as nurses, and in 10 they were working while still sick. There were 99 epidemics of scarlet fever, in 68 of which the source of infection was traced to illness of persons at the dairy; in 17 the employees themselves were suffering from scarlet fever, and in 10 they were acting as nurses to scarlet fever patients. In other cases the infection was through the storage of milk near infected rooms, or the poison was brought by cans or bottles from the patient's houses. There were 36 cases of diphtheria, in 13 of which the disease existed at the farm or dairy. When it is remembered that some of these epidemics have numbered hundreds of cases with many deaths, the great importance of this is apparent and the amount of mischief which is possible through the neglect of a single person seems appalling."

Dr. Harrington, of the State Board of Health of Massa-

chusetts, has recently made public the facts relating to an epidemic of scarlet fever spread through the agency of milk and originating in the person of an employee, whose duty it was to taste milk which came to the dealer from the country.

In the summer of 1903, in the town of Bayside, Long Island, within the limits of New York City, there was an epidemic of typhoid fever, in which 86 persons were effected. Of these 86 persons, 84 were found to have used the milk from one farm. Upon investigation made under my supervision by the Department of Health Inspectors, it developed that two cases of typhoid fever had recently occurred on this dairy farm; that the water from the well and the water from the cistern used for washing the milk cans and milk bottles was contaminated and that undoubtedly the cases of typhoid fever in the village had their common origin and were spread by the milk from this particular dairyman. There is no reason why such conditions may not exist on many farms supplying milk to large cities causing cases of typhoid fever which are difficult and often impossible to trace.

An interesting case of typhoid fever is at present in a hospital of the Health Department of New York City, which may throw new light on the method of spreading this disease. The patient, a woman, a cook by occupation, has infected during the last five years, seven families of the nine she has been serving with, causing 32 cases of the disease, two fatal. She has been under observation for five weeks and is daily passing typhoid germs in the feces. As far as can be learned she has never had the disease herself in a serious form.

What possibilities this suggests of the danger of infection by the hands of milkers. May the milking machine soon come into general use.

Wherever milch cows have been subject to the tuberculin test, a certain proportion have been shown to be suffering

with tuberculosis, from 10 to 40 per cent. in different localities. It must be admitted that in the light of our present knowledge the question of danger of the transmission of tuberculosis through milk is only one of degree, and that proper protective measures must be universally adopted.

The practical results obtained by the New York Department of Health's investigations into the city's milk supply were twofold:

In 1902 a regulation was adopted requiring that no milk should be offered for sale in the city which was at a temperature above 50 degrees F.; this requirement is now embodied in the sanitary code, is a law and is strictly enforced.

Systematic inspections of conditions surrounding the production of milk in the country was also begun and has been recently very largely extended.

The Milk Commission, a body of physicians appointed by the County Medical Society, adopted a definite bacteria standard for so-called certified milk (containing less than 30,000 bacteria in 1 c.c. milk) and the dairies found on inspection to have complied with the requirements of the commission as to construction of the stable, its cleanliness, the condition of the cows and helpers (freedom from contagious diseases), the bottling of the milk at the farm in a milk house separate from the barn, the proper cleansing and sterilization of the bottles and the maintaining of the bacteria and other standards were entitled to a certification label. Frequent inspections were made of the farms and tests of the milk.

Physicians of the City were sent the names of those dealers who marketed certified milk and also copies of the tests.

The most gratifying results have been obtained by the use of this grade of milk for infant feeding but unfortunately it is beyond the reach of the poor and even of those of moderate means. When commercial milk, such as is dipped from cans in the retail stores, sells at from three to five cents per quart, the certified milk is bringing from twelve to twenty cents; and

even at these prices, with the comparatively limited production the actual producer is dissatisfied with the small profit he claims to be making.

That the public does not sufficiently appreciate the advantages of certified milk is indicated by the fact that while it has been on the market since 1901 the daily supply amounts only to 16,000 quarts in this city, of a total consumption of 1,500,000 quarts, one per cent. of the supply.

During the last two years the activities of the Health Department have been directed more and more to the inspection of the conditions surrounding the production and handling of milk in the country, first attention being given to the creameries. later to the dairy farms. The creameries being owned by the milk dealers and under their direct control were improved as directed by the Department with little delay. The inspection of the farms was soon found to be an enormous task with endless detail and requiring a very large force of help at very great expense. It developed that most of the dealers had little or no control over the production of the milk which they handled and that improvements must be carried out through the individual producers. From a purely legal standpoint, the Department has no jurisdiction beyond the limits of New York City. Practically, control has been acquired for the reason that as no milk can be sold in the city, without a permit from the Department of Health, the threat that a dealer's permit will be revoked if he accepts milk from a producer who is blacklisted, is a rule quite sufficient.

The wide publicity given to the official reports of the inspections made at the creameries and dairy farms and the request for large sums of money for the purpose of enlarging the inspection system has operated to make the discussion of the milk question in our city one of the most active before the public at the present time.

For months our daily press has made it an important news feature. Recently a conference on the whole milk question

was inaugurated by the Association for Improving the Condition of the Poor, at which officials and authorities on pure milk from various cities joined with our experts in a consideration of the many questions involved.

The proceedings of this conference have since been published and the outcome of the meeting has been the formation of a Citizens' Milk Committee and a Milk Commission appointed by the Mayor.

In addition the Board of Aldermen has under consideration an ordinance which would require:—

That all milk and cream which is not produced from herds certified as being free from tuberculosis or as not containing less than 500,000 bacteria in one cubic centimeter shall be pasteurized by exposure for at least twenty minutes to a temperature of 158 degrees F.

We understand that our city fathers have wisely concluded to delay action on this measure until the Mayor's Milk Commission has made its final report and recommendations. As the local health authorities have ample powers to make any regulations that may be necessary to protect the milk supply and as there are a number of men upon their staff who are recognized as leading experts on the subject of milk and its sanitary control, many of us are of the opinion that the adjustment of the whole matter may with safety, be left with that Department.

But the interest taken in the agitation for a cleaner milk supply does not stop with the city. A bill in relation to the pasteurization of the milk supply has been introduced in our State Legislature, the principal provisions of which are:

That all milk brought into New York City should be subject to pasteurization, and that the pasteurization should be carried out under the supervision of the Department of Health.

There is, however, no likelihood of such bill becoming a

law. The state could best aid the city by taking up the question of tuberculosis among milch cows with a view to eradicating the disease at the outset by destroying infected cattle.

The state, through the health officers and the Department of Agriculture, should enforce sanitary regulations on the dairy farms.

The principal features under discussion of how the city milk supply is to be improved are:

Should the system of inspection in the country be increased and if so, can it be entirely relied on to produce a clean and safe milk supply?

Is the pasteurization of milk desirable, and if so, under what conditions?

Should pasteurization be made compulsory?

If pasteurization is approved of, should it, in part, or entirely, take the place of inspection?

Never before has the subject of the pasteurization of milk been so generally discussed. It is unfortunate that many of those who are taking part in the discussions have no clear idea of what the term pasteurization really means, or what effect it has on milk chemically, bacteriologically, physically, or clinically.

Let us try to determine what the phrase "pasteurization of milk" really implies. Sterilized or cooked milk having been objected to by the adult consumer on account of its peculiar, and to many disagreeable, taste; and by most physicians on account of its decreased digestibility when used in infant feeding, experiments were made to reduce the germs in milk, and especially to destroy all disease germs by some other method.

It was necessary that the process should not injure the flavor or seriously impair the digestibility of the product. The most important of such processes is "pasteurizing," originally devised by the scientist, Pasteur, for the treatment of wines. As applied to milk it is usually considered to refer

to the method of heating milk to various degrees for varying periods of time; different authorities giving different directions for special purposes.

Pasteur recommended heating to 158 degrees F. for a short time.

The U. S. Department of Agriculture's (in Standards of Purity of Food Products) definition, is:

"Pasteurized milk is milk that has been heated below boiling, but sufficiently to kill most of the active organisms present and immediately cooled to 50 degrees F., or lower."

L. Emmett Holt, M.D., a noted specialist on infant feeding, described pasteurized milk as being prepared by heating to 150 degrees F. for thirty minutes.

Russell, in his Outlines of Dairy Bacteriology says of pasteurizaton:

"In this method the degree of heat used ranges from 140 to 185 degrees F., and the application is made for only a limited length of time."

Swithinbank and Newman, in their Bacteriology of Milk define it as follows:

"The term 'pasteurization' is now used to designate a process of heating at any temperature between 60 degrees C., 140 degrees F., and 90 degrees C., 194 degrees F. for a short period of time, not exceeding twenty minutes. In practice, the temperature of 75—85 degrees C.(=167 degrees to 185 degrees F.,) is generally adopted. There is no fixed standard for the temperature of pasteurization, except that it must be above the thermal death point of pathogenic bacteria and yet below the boiling point."

W. H. Park, M.D., in Pathogenic Micro-organisms, states:

"It is sometimes undesirable to expose food, such as milk, to such a temperature as will destroy spores, because of the deleterious effects of such high temperatures, and yet a partial sterilization is necessary. Under these conditions we heat the food stuffs for thirty minutes to such a

temperature (158 degrees F.) as will kill the bacteria in the vegetative form, but will allow the spores to remain alive."

As a matter of fact, the methods of pasteurization of milk are continually being modified to conform to more advanced knowledge respecting the destruction of pathogenic organisms or new requirements relating to the condition of milk for infant feeding.

Pasteurization of milk has heretofore been carried out by one of the methods described above, either in the household, in which case the milk is contained in bottles usually of the type of nursing bottles; at infants' milk depots in similar containers, or commercially in bulk by the milk dealers.

This latter method is practised on a large scale in the creameries of Europe, particularly in Denmark and Germany, and to some extent in England. On a visit to Berlin and Copenhagen about five years ago, I found pasteurized milk being used very extensively in those cities and I am informed that pasteurization is required by law in Denmark. In both cities the process used involved the holding of the milk at the increased temperature for at least twenty to thirty minutes.

For some years, a method of heating milk by what was termed "continuous process pasteurization" has come into vogue and has been popularized, especially in this country. This process was particularly welcomed by milk dealers of our large cities on account of its comparatively small cost, rapidity of operation and the good commercial results obtained by it. In New York the strong agitation for a clean milk supply, the lack of control of the sources of supply of the product by the dealers, the lack of official supervision, either municipal or State, the refusal of the dairy farmers to make improvements unless they could obtain a better price for their milk, and the reluctance of the public to pay the dealer an advanced price, all operated to pave the way for pasteurization.

The manufacturers of pasteurizing apparatus, particularly

those who had operated in the European countries, were surprised to find requirements in our milk trade which they were entirely unfamiliar with and which made it necessary to modify their process. They found that here the public demanded, especially in the case of bottled milk, a distinct "cream line." The milk consumer has for years been educated to this phenomenon as a proof of the richness of the milk, and also as evidencing that the bottling had been done in the country, which was considered to be especially desirable. The heating of milk for half an hour at a temperature of 150 degrees F. or over has the effect of either entirely preventing the rising of the cream or of delaying it very materially.

No milk dealer was willing to adopt a process which would spoil the cream line of his milk. To satisfy this objection, the process was modified to what is generally known as "rapid commercial pasteurization" which as now commonly practised is the heating of milk in a continuous apparatus, in which it is exposed for periods of from five seconds to thirty seconds from 140 degrees F. to 165 degrees F. This method of treating milk was adopted by dealers solely for commercial purposes, the advantages being that his losses from sour milk were very much reduced if not done away with entirely.

No special claims were made for this milk by the dealer and in fact it was placed on the market without any label to distinguish it from the regular unprocessed supply. One large firm of our city has been furnishing a high grade bottled milk, "commercially pasteurized" for at least five years.

In the summer of 1906 the Department of Health enacted the following sections of its sanitary code:

"No milk, which has been heated, pasteurized, sterilized or subjected to heat in any manner for the purpose of preservation, shall be received, prepared, held, kept or offered for sale or delivered in the City of New York unless the receptacle in which it is contained bears a label stating plainly the process to which the milk has been subjected."

The dealers as a result of this requirement placed labels reading "Pasteurized" on all cans and bottles of milk which had been treated by any process of heating. It was thought by those who disapproved of pasteurizing that the label requirement would interfere with the sale of this milk, the advocates on the other hand believed that it would encourage its use. As far as we can learn the latter is what has actually occurred.

Let us consider what effect the different degrees of pasteurization have on milk.

The public is so opposed to the cooked or scalded taste of heated milk that this must be avoided in pasteurization of milk for general use. It is claimed that a momentary exposure to 170 degrees F. may be made without any material deterioration of flavor—but a temperature of not over 158 degrees to 160 degrees F. may be used for ten to fifteen minutes.

For an exposure of ten minutes or longer a temperature exceeding 150 degrees F. will entirely prevent or at least seriously retard the rising of the cream. A temperature of 158 degrees to 160 degrees F. may be maintained for a minute without interfering with the creaming property.

I have collected a very large amount of information giving the experiments of many investigators on the thermal death point of the various disease germs which might be found in milk but will not burden you with these details at this time.

You will readily understand from the vagueness of the term pasteurization that we must first agree on some definite time and temperature limits before we can discuss what effect the modes of treatment will have.

For convenience sake we use the term "prolonged pasteurization" when the milk is heated from 20 to 30 minutes to a temperature of from 140 degrees to 160 degrees F. "Rapid commercial pasteurization" to mean heating for one minute to 155 degrees to 165 degrees F.

According to the best authorities the effect on the germs of

diphtheria, tuberculosis, scarlet fever (contagion), and typhoid fever would be by

Prolongd Pasteurization:—

Total destruction of diphtheria and typhoid bacilli, and the contagion of scarlet fever.

As to tubercle bacilli, the lower temperature would usually kill all and always the majority; the higher temperature would invariably kill if the whole milk is uniformly heated.

By Rapid Commercial Pasteurization:—

Such temperature, as a rule, killed all diphtheria and typhoid bacilli and, as far as we know, the contagion of scarlet fever and the very great majority of tubercle bacilli, not more than one in 1000 remaining alive, and even these so crippled as usually not to infect when taken by the stomach.

The effect on ordinary bacteria common in milk is that from 95 to 99.9 per cent. are killed, very few, except spore-bearing bacteria, surviving. The higher temperature destroys only slightly more than the lower, because those remaining alive after heating for one minute to 155 degrees F. are very resistant forms.

The following bacteriological examinations have been made in the course of routine work and illustrate the effect of "rapid commercial" and "prolong pasteurization."

Rapid Commercial.			Prolonged.		
Raw Milk bacteria per c. c.	Pasteurized bacteria per c. c.	Temperature for 30 seconds	Raw Milk bacteria per c. c.	Pasteurized bacteria per c. c.	Temperature for 33 minutes
5,100,000	5,700	158° F.		7,950	148-132° F
7,025,000	45,900	155° F.	896,000	575	152-140° F
3,550,000	68,150	155° F.		525	152-144° F
				150	162-146° F

There has existed in the minds of physicians who have made a special study of infant feeding great differences of opinion in respect to the effect of heat on the digestibility of milk; at present the consensus of opinion may fairly be said to be:

That heating impairs the digestibility of milk, especially if the temperature reached at or near the sterilizing point. In the case of heating at a lower temperature, as in prolonged pasteurization, the effect is much less. There is no data at hand in respect to "commercial pasteurized" milk, but it must be assumed that the effect on the digestibility must be even less than in prolonged pasteurization.

Dr. L. Emmett Holt's published opinion on this point is:

"Heating to 150 degrees F. for thirty minutes does not affect the taste of milk and does not render it more constipating. The unfavorable effects, if there are any, are so slight that they need not deter one from the use of pasteurized milk for infants even for long periods. The preference, however, should always be given to milk which is so clean and so fresh as not to require any heating."

Dr. Joseph E. Winters, another specialist in infant feeding, says of pasteurized milk:

"It is a popular belief that pasteurization makes cow's milk, even if fresh and pure, a more suitable food for infants. This is erroneous; fresh, pure milk is not improved by pasteurization; it is not more digestible, and it is in no way a better food for an infant.

"Does pasteurization deteriorate fresh milk? I have seen scurvy where pasteurized, modified milk had been the only food. Recovery was rapid with the continued use of the same food, raw.

"Fresh, raw milk is superior in nutritive value to that which has been artificially changed by pasteurization."

Should the system of inspection in the country be increased, and if so, can it be entirely relied on to produce a clean and safe milk supply?

All milk should be produced under proper sanitary conditions from healthy animals and the system of official inspection in the country should be carried out to the fullest possible extent.

To those familiar with the whole problem of the commercial production of milk it seems unlikely that inspection alone can ever be relied on to produce a safe supply for large cities. A consideration of the epidemics described above will emphasize the reasons for this conclusion. Who can tell, for instance, when tuberculosis will be eliminated from our dairy farms?

Can we conceive of inspection so thorough and effective as to prevent the spread of typhoid fever and scarlet fever by means of milk? Let us strive for this end, but in the meantime, let us not neglect any steps to insure safe milk supplies.

Is the pasteurization of milk desirable, and if so, under what conditions?

Professor Sedgwick, the eminent sanitarian, in his Principles of Sanitary Science and the Public Health, says:

"Most of the milk sold in Boston is at least twenty-four hours old when it reaches the consumer. Much of it comes by rail from distant parts of Massachusetts, and even from other states. The consumer is, as a rule, totally ignorant of the place of origin of the milk which he buys, and equally so of the conditions, whether wholesome or unwholesome, sanitary or unsanitary, of the farms on which the milk is produced.

"It would be of great advantage to consumers and producers alike if the milk farms tributary to a great city could be visited and inspected; and it would add materially to the keeping qualities of milk (and therefore to its economic value) if it could be carefully pasteurized before beginning its journey to the City.

"Moreover, inasmuch as typhoid fever is often disseminated by milk and there is reason to believe that milk is a vehicle for some other infectious diseases, such as tuberculosis and possibly scarlet fever and diphtheria, pasteurization, which is a safeguard against the conveyance of such diseases by milk, commends itself to every sanitarian.

"Pasteurization also postpones the decomposition of milk and its consequent staleness by destroying germs which produce souring, and thus helps to keep it in this respect nearer to the 'normal' required by infants."

Most of those familiar with the conditions must agree with Prof. Sedgwick in this statement. Pasteurization of milk is desirable whenever the safety of the supply is not assured.

I have recently had occasion to make inquiries as to the cost of pasteurization of milk in bulk and the information obtained may be briefly summarized:

The figures are based on the use of what is called the regenerative system, in which by ingenious arrangement of position, the tubes carrying the incoming cold milk are adjacent to the tubes in which the heated milk flows, the change of temperature resulting, in a very economical operation. Dealers who have used the various systems of pasteurization inform me that the regenerative one can be operated at a cost of about one-third of that of other methods.

The smallest economical plant is one in which 6,000 quarts of milk can be pasteurized at one time, operating continuously for about one hour.

The installation cost with boilers and all attachments is $3,500.

Cost of pasteurizer alone $2,000.

In many creameries where boiler and engine are already installed for other purposes, it is feasible to use the exhaust steam from the engine to obtain the heat for the pasteurizer with no additional expense.

It is estimated that the expense of the pasteurizer would be paid for in the course of about one year, based mainly on the saving from losses of sour milk. The cost of pasteurization by above method (commercial pasteurization) with heating period of about one minute would be one-tenth of one cent to one-quarter of one cent per quart.

In the case of "prolonged pasteurization" with heating period

of about thirty minutes the cost would be about one-half of one cent per quart of milk.

A special machine of this type is now in operation in New York City and tests of its bacteriological efficiency are being made.

The advantages and disadvantages of pasteurized milk appear then to be.

Advantages.

The reduction of the number of bacteria.

The enhancing of the keeping quality.

The destruction of disease germs.

The great benefits derived from its use in infant feeding, in hospitals, infant milk depots and in private practice, will be attested by most physicians.

Disadvantages.

When the temperature used has been high the digestibility of the milk is affected and such milk will not agree with some children.

That milk which would ordinarily not be marketable on account of its age, might be pasteurized and its faults hidden.

That by the destruction of the ordinary acid producing bacteria, nature's danger signal of old milk, the souring process, is interfered with and that more serious changes may take place without the knowledge of the consumer.

It is greatly feared by many that the adoption of pasteurization will interfere seriously with the extension of the sanitary supervision of the production of milk, a movement which, in our opinion, should be encouraged by every means.

Recently while the public discussion on milk was at its height in our city, in a letter on the situation I made the following statement which may be interesting at this time:

"There should be inaugurated by the Department of Health of the city a system of official supervision by inspection of the sanitary condition under which milk is produced. In all such cases where the Department of Health has not the proof that

milk is produced under satisfactory sanitary conditions from healthy animals proper pasteurization should be required. A pure milk is always better than a purified milk. The public should insist upon the whole question of the prevalence of tuberculosis in cattle being taken up at once by the authorities, to the end that a comprehensive plan be provided for the eradication of this disease, both in the interest of public health and the prosperity of our dairy farmer.

"We must, of course, realize that in the carrying out of these plans the cost of production of milk will increase materially."

It is estimated that about twenty-five per cent. of the total daily milk supply of New York City is pasteurized.

THE PRESIDENT: The next paper of the afternoon, on the Pasteurization of Milk for Public Sale, will be presented by our own eminent home authority, Dr. Rotch.

THE PASTEURIZATION OF MILK FOR PUBLIC SALE.

By Thomas Morgan Rotch, M.D.

When men assemble to discuss a subject of special importance there are always a number of sides to the question under consideration, according to the nature of the subject. All subjects worth discussing are important: important, it may be, in some special line of investigation which interests alone the workers in that special line of thought, or in addition to this limited rôle of specialism, the subject may be of great public interest and importance as a whole.

Today we are dealing with the latter class. The great general subject, important among all peoples, of all ages and occupations all over the world, namely—Milk.

There is, however, one particular age among human beings to which it is most important of all, and that is infancy. The younger the individual the greater the rôle which the milk question plays and always will play in its welfare. No statistics need be quoted to show this. We all know the tremendous mortality which exists among human beings in the first year of life, and we all know how this mortality depends in great measure either directly or indirectly on the food. We all know, on the contrary, that the lowest death rate is shown among those human beings who are fed for the first year of their life on good human beast milk.

It is, therefore, the milk supply from animals, usually the cow, which in its widespread effects kills the greatest number of human beings in early life. Milk, then, is a subject which should be studied from the point of view of public health; and we at once must acknowledge that it is not merely of chemical and bacteriological interest and confined to the world of science, but that it becomes a great broad public question, affecting to its very centre the whole human race.

This means that we may lose at the beginning of life a being who later may have proved to be endowed with a great practical mind, intended by nature to evolve some wonderful discovery,—a discovery which may benefit millions of the world's inhabitants; possibly a discovery which may show how some devastating infection such as diphtheria or yellow fever can be stamped out; knowledge by which millions of human beings may be saved, instead of entering on their life's work crippled in mind and body and thus incapacitated by diseases starting in the milk period of life.

Milk, when pure, is an ideal food, but as commonly used it represents a rich culture ground for pathogenic organisms. Again, milk is a food which of all foodstuffs is the one most difficult to preserve pure and to handle with success as to its purity.

This great general subject, then, of milk for the people, necessitates for its betterment no one set of workers, but a combination of all who are connected with milk, its production, its care and its sale, as well as all who are interested in the welfare and improvement of the human race. Harmonious and combination work, then, should be done by the farmer, the contractors, the chemists, the bacteriologists, the physicians and the Boards of Health. Unfortunately, this unanimity of purpose does not exist. We therefore should call in the aid of the state to see that this combined work shall be insisted on.

I suppose that you have called upon me as having especially worked in milk in connection with the feeding of infants. This I have done for the last twenty years, and the more I have investigated the problem, the more I have found the need of an absolutely clean milk to be used in the various percentage combinations which we give to infants.

As we are today especially discussing whether all the milk supply should be pasteurized, I shall first state my ideas as to pasteurization. Those who prescribe milk and say that it should be pasteurized should know enough to say at what temperature it shall be heated. In the medical world, especially in connection with infant feeding, we should not use the word "pasteurized"; we should say heated at 212, or heated at 155, or heated at 167, and many different gradations, because we believe from our experience in the treatment of infants that one degree of heat is what should be used for a special individual and another degree for another, just as we recognize that we should give certain percentages of fat in one case, and certain percentages of sugar and certain percentages of the proteids, and just as we say we should give more of the whey proteids in certain cases and more of the caseinogen in others. We place them all upon an equal basis; we consider them equally important; and therefore as physicians

we should protest against a word which represents a generality. It means nothing to the physician who really understands what the public needs, and it means a very great deal to the public, who are taking it for granted, if the word "pasteurized" is used, that they are using a safe food. This latter view has been proved to be absolutely false. We therefore should not use the word "pasteurized."

In regard to the degree of heating in infant feeding we do not have strong prejudice against heating milk at 212. In my clinical cases, and from observations and knowing what I am doing, I am in the habit at times of heating to 212 We cannot take up medical subjects especially here, of course, but all this fear about infantile scorbutus (scurvy), for instance, from heating at 212, is mostly unnecessary, for I believe that there is still much to learn about scorbutus. I believe that we have not discovered the cause of scorbutus. In those cases where scorbutus has apparently occurred in infants who were being fed on milk heated to 212, it may have been some other quality in the milk which produced the scorbutus, and that either the percentages which the infant has been fed upon are not those which are adapted to and fitted to that especial infant, or that it is an exceedingly dirty milk which they have been boiling at 212, and which necessarily does not become a sterile milk in the meaning of infecting the individual.

For years after leaving off the heating at 212 we heated at 167. We now know that the heating at 167 affects a certain part of the proteids of the milk, and in many cases this is just what we wish to avoid. We may not wish to do it in the special case that we are feeding, and therefore we do not heat at 167. At other times it is found that 167 will be best adapted to the individual, both in the sense of digestion and in the sense of killing a certain number of organisms in the milk. It is by no means proved that heated milk is not so digestible as unheated milk. We are all of

us continually in practice using sometimes heated milk, sometimes not, by preference, of course, not heating at all where the bacterial content is so low that we do not fear sending the milk quite long distances in cold weather, and feeding most of the infants that we take care of within the city limits where we can obtain a clean milk. We also very frequently heat at 155, and although so far as I can ascertain, heating at 155 does not definitely change any of the elements in the milk, yet it is perfectly possible that it may do so.

I should, therefore, oppose compulsory "pasteurization" of milk, except in cases where it is very evident that it is needed for a special purpose. If anything in connection with the so-called "pasteurization" is to become a law, the milk should not be stamped as "pasteurized," but so as to show to what degree of heat it has been subjected. In this way the physician will know what he is using, and the public will gradually learn to understand that heating the milk in certain instances is a proper and good measure.

It is a fact that certain organisms are killed by "pasteurization," but we cannot kill the toxins of these organisms by heat, and simply "pasteurizing" or sterilizing will still allow the milk to contain elements which are exceedingly dangerous to those who drink it, and especially dangerous where young infants are concerned. Thus although you can get rid of many of the living organisms, yet there are many serious cases where the organisms have been killed, but the toxins, which you cannot kill, remaining, have caused symptoms of serious callapse. The more impure the milk is from dirt, the greater is the chance that the toxins or pathogenic organisms, may still be in it.

The heating of milk, if it is done, should be done intelligently. Otherwise, it will become a cloak for dirt, and dirt is the most dangerous of all the things which enter into milk, as it forms a culture ground for pathogenic organisms as well as more benign organisms in the milk.

I have especially spoken of infants, because, I have dealt more with early life than with these other branches of the question, but when you consider that most deaths are caused among infants, and that milk, and clean milk, is of more importance in infancy than at any other period of life, pure milk becomes a serious question of infant feeding. It is the food which is adapted to the age, a food which that age ought to have, and, of course, adults have other forms of food. There is no question, then, that we should endeavor to stamp out disease by using clean milk.

I have given my reasons for not believing in the work of "pasteurization," for not depending upon the name, and for not always heating the milk. In connection with the importance of cleanliness in the milk is that of the bacterial count. It seems to me unwise that a high bacterial count should be allowed as the limit for pure milk. Of course, it costs more to carry out the protection of milk to such a degree as to lower the bacterial count to any degree, but I believe that it would be money well spent to do so. I believe that we should begin by getting a clean milk with a low bacterial count, and that this should be our first endeavor. Later, the milk should be heated according to the individual case and conditions, and not as a measure for preservation. The improper method of heating now in vogue, where it is said to be "pasteurized," only preserves the milk some five or six hours longer than would otherwise be the case. This is sufficient, however, to get the milk to the house, where it soon sours, and this commercial "pasteurized" milk, after it has turned sour, seems to be in a great deal worse condition than when natural souring took place. This is the result of our clinical observations.

Each city, each town, is a problem in itself. What is necessary in New York, and in that sense good, may not be at all necessary for Boston or for the smaller cities anywhere. Therefore, we should judge from our own surroundings. We should take advice from those who are making a

study of this question. The boards of health know better than the physician what can be done. The physician simply asks for a clean milk, and then let him do with it as he pleases. I myself do not think that you have any more right to pass a law that all milk shall be pasteurized than you have to pass a law that all milk should contain 3 1-2 per cent. or 4 per cent. or certain variations. You have your limits of percentage. But there is also a limit to heating the milk at all. We physicians will be very glad to get rid of some of the old laws about milk, which, according to our ideas, give more trouble than even the law of compulsory pasteurization would give rise to. For instance, absolutely good Holstein milk is at times not salable on account of its total solids not coming within the limits of the law. The law demands during winter 3.70 fat and 13 solids, while in summer a 3 per cent. fat and a 12 solid. As we all know, the Holstein milk, unless the cows are especially fed, falls below this standard. Now, from a medical point of view, the Holstein milk is exactly what we find best for infant feeding, and it is an extremely good milk for any one to drink. The immense number of infants, however, who live entirely upon milk, should be taken into consideration in this question, and I believe that the people should be allowed to buy this milk just as they should be allowed to buy a milk modified to suit the special infant, who is being taken care of. I hope that the boards of health will pay attention to this question, as it is absurd for pure milk from any grade of cow to be debarred from the market because its analysis does not show what is required by an unnecessary and unjust demand.

There should be a standard for the milk from every breed of cow, and not merely an arbitrary standard which has nothing to do with the purity of the milk. It is far more important to legislate in favor of reducing the standard of the bacterial count than to attempt to obtain pure milk by demanding an arbitrary total solid.

There is another point which should be called attention to, and that is that the bacterial count varies very much according to the one who makes it. More money should be spent by the State in employing competent men to make the bacterial count. We know that under certain circumstances exactly the same milk will be said to be good by one man and poor when examined by another. This may happen, of course, in any chemical or bacteriological question, but it is worth considering.

I believe that in all our attempts to improve the milk supply and obtain pure, clean milk, we should begin with the producers at the farms. When we are told that it will cost more, we should answer that we know that clean milk costs more than dirty milk. The question of price, however, is very much more dwelt upon by the rich than by the poor. The poor are often willing to pay a higher price for their milk because they know that they will have less sickness among their children and that their physician's bill will be very much less when they are paying high rather than low prices for their milk. Milk when pure is such a valuable food that it should be well paid for, and I therefore do not believe that we should encourage the farmers to sell their milk at a low price, but that, on the contrary, we should encourage them to place their price at a figure that will enable them to provide a clean milk without loss. I believe that the State ought to take this matter in hand and in some way aid the producers. I believe that as the State has given so much aid in stamping out diphtheria by having antitoxin given free for this purpose, that it should in some way help in regard to a pure milk supply. As soon as an attempt is made to keep down the price of the milk this invariably prevents its being kept clean, and the milk supply will then get to be such that any makeshift, such as pasteurization, will make the matter far worse. We are already having quite a large quantity

of milk sold which is stamped "pasteurized." This pasteurization is often absolutely insufficient, so that we gain nothing and lose a great deal in the crusade against impure milk.

Cleanliness in milk should always come first. Then if for a time we should have a higher rate of mortality, and a larger number of babies should die, this would in the end be better than for us to encourage a thoroughly irrational method of attempting the reform. In New York they will at first probably reduce their mortality a very great deal by pasteurization but in Boston and a number of the smaller cities throughout the country, I believe that nothing lasting can be accomplished in this way. Of course, throughout the heated periods of the year, the heating at 155 or 167 of a pure, clean milk may be done to advantage. During the winter months, however, it would be much better to insist upon a clean milk, and when summer came, some additional means for preservation.

The great point is that the milk should start clean from the farm, and that the heating for preservation should be done at the farm. If this is not done, very few bacteria may be in the milk when it leaves the farm, but by the time it reaches the contractor the number will multiply immensely, and thus late pasteurization will give all the more opportunity for toxine poisoning.

The fact is that each case of milk supply is a problem and must be dealt with by the community in which it arises. I would suggest that in this question of pasteurization, which we are discussing, and of pure milk, that the producers have not been sufficiently consulted. Would it not be well that an explicit declaration should be made by the State of what constitutes a sanitary condition of barns, herds and other details in obtaining clean milk, and that a penalty should be imposed upon those who violate this law? The reform should begin back of the farm, in placing

the responsibility of fixing the standard for purity on the State. If a standard for purity were thus established, the farmer should then determine whether or not he would be a producer of milk. With an undefined and undefinable standard of pure milk, as it exists at present, the producer is in a state of doubt and uncertainty. The practicability of a standard should be determined before its enforcement is ordered, so that preparation can be made by the producers for the changed conditions. These conditions should, however, be made after consultation with the producers on whom the onus of the work is to be thrown. One of the conditions may be that the production of milk should, for chemical reasons, be a business separate and distinct from its distribution. In this way it should be not only the right, but the duty of the State to establish safe and clearly defined regulations under which the milk for consumption should be transported, and that the enforcement of such regulations should be demanded not only by the State, but by the intelligent producer as well.

The producers find that the character and quality of their herds is reduced because of the maintenance of an arbitrary milk standard, which is so low that it works a positive injury to the Jersey and Guernsey breeds, and which is so high that it fails to legalize the sale of milk from their best herds of Ayrshire and Holstein cows. This oppressive standard takes the form of an enforced sale by the producer of his product (previously contracted for in times of surplus production) in the consuming market, and this notwithstanding that arrangements had already been made to carry this surplus at a stipulated price.

Again, the development of pure bred stock has been retarded and the Massachusetts farmer has been deprived of the profit arising therefrom. In Concord, within twenty miles of Boston, where a producer has seventy-five herds, there is not one of pure bred stock exclusively, as the pure

bred herds of Holsteins and Ayrshires have been supplemented by Jersey and other grades, and the Jerseys have been reduced by supplementing Ayrshire, Holstein and Durham grades. Such questions as these should be carefully investigated before we can with any degree of success improve our milk supply.

What we need is a competitive market for pure milk from Massachusetts dairies based upon the law of supply and demand. I will say in conclusion that I make this statement after hearing what the milk producers have to contend with, that it is a question which should be placed under State legislation and that the various problems should be thoroughly investigated. Possibly the producer might have his own special milk in cars provided for that milk brought nearer to the actual consumer than is at present the case. I would also suggest that any pure milk, unadulterated, should be salable, provided that the standard percentage of fat and total proteid corresponding to the especial breed (whether Holstein or Jersey) were maintained. If in certain cases it would seem best to have the milk "pasteurized," then the degree of heat should be known to the buyer. Physicians and people could then judge for themselves, and not be bound by an arbitrary law.

THE PRESIDENT: This very interesting subject has of course many sides to it, all of which I hope will be presented before we get through with this meeting. I am going to call first upon my young friend, Dr. Norris, of Cambridge, who is in the business at present of suppressing bad milk and attempting to bring to the community better milk.

DR. NORRIS: As regards this problem, it seems to me that as we look back over the history of the improvement

of the water supply of the State of Massachusetts we get a good deal of valuable information, and that the improvement of our milk supply should follow lines very similar to that. The time was not very long ago when almost every householder in New England had his back door well. Shortly later wells were done away with, and we used ponds and various water supplies near by. As our Metropolitan water district became very much larger, it was necessary to go farther out and get huge reservoirs to supply the city. Today it seems to me that our contractors, upon whom we depend for the bulk of our milk supply, have gone through these periods: First, the neighboring towns, then farther and farther back, until now the bulk of the supply of the city is brought in from a great distance from the city. If we look over the railroad maps, very little of their supply is derived from within 20 miles of the city, but almost all of it from 100 to 200 or 300 miles out. In talking with these gentlemen you will find that the size of the farm from which our milk supply comes is one of a very few cows, dairies of from six to eight cows per herd are the ones that are producing the bulk of the milk supply of our city. Now, as we compare this condition with the improvement in various New England industries we find that the tendency of the times has been to centralize the manufacture of different products. Our mills were originally small mills in every hamlet throughout New England. Today they are largely centralized in big manufacturing establishments. It seems to me that as time goes on we have got to foster larger dairies. A dairy of 50, 75 or 100 cows can be administered in a much more cleanly manner than can the small dairy wihch is an adjunct to the ordinary country farm. The farmer is naturally averse to clean pursuits, is naturally averse to carrying out rules of tidiness. It is a side show in his life work, whereas an up-to-date, well

managed farm of the type of which we should see a great many in our suburbs, is really a rarity, and it seems to me that our contractors would do very well to subsidize some of these farms within the zone of 20 miles of our city which today are really neglected.

The point at issue, the pasteurization of milk, it seems to me in its practical aspect, is solely one of covering up the dirt and deterioration of milk. If we maintain the laws which are at present upon our statute book, and demand the low bacterial count and a high degree of cleanliness upon our farms, we are working in the right direction; but to allow this pasteurization project to become an enactment it seems to me will postpone the day to a very long period hence before we can get the conditions upon the farms which are hoped for in New York State and here.

THE PRESIDENT: I know that the Association will be very glad to hear from some of the representatives of the other side of this question, the producers of milk. There are several representatives here, and I hope some one of them will say his say upon the matter.

MR. WHITING: Mr. Chairman, you mention the producers of milk. We do produce milk to some extent, although our business is chiefly that of milk contractors. To say that we are deeply interested in this subject hardly expresses it. Our attention is directed especially to this question just now because we do not know whether to launch out into pasteurization or to go on, as Dr. Rotch says, "trying to bring about a condition in the country which will get a sanitary milk for the Boston market," thus doing away with the dangers, if there be any, by pasteurization. Very much is being done in the country, more than anybody is aware outside of the City and State Boards of Health. The reason that we are so diligent is that we appreciate the importance and responsibility of getting as nearly an ideal milk supply for this market as can be had.

The contractors who are in this room supply the greater part of the milk that is used in the City of Boston and its suburbs. I know it is a fact that they are all working very energetically to that end. Farms that are in an unsanitary condition, our inspectors, who are in part veterinarians, visit at frequent intervals. These men are constantly travelling over our whole milk territory.

It seems as though our condition in Boston is rather different from that in New York. It is not uncommon to bring milk three or four hundred miles to the New York market, while two hundred miles is the outside limit for Boston. There is hardly any milk within twenty miles of Boston brought to this city, except by a few wagoners (as they are termed.) Dr. Norris suggests these farms might be reclaimed for the production of milk. I think this would hardly be practicable, for the wealthy man of Boston wants his nearby farm for his pleasure and is fast getting out of the notion that there is much satisfaction in producing milk to sell to the Boston market, even though he gets eight, nine or ten cents per quart. The contractors get the greater part of their milk supply beginning at a distance of forty miles from Boston up to one hundred miles, so the degree of freshness of the Boston milk supply as compared with that of New York is very much in favor of Boston. We can bring milk here, in other words, in the raw state, with greater safety to the consumer than can be done in New York.

We buy practically no milk that is not cooled by the use of ice on the farms. We have put out circulars for the last three or four years to the effect that we would not take milk unless cooled in ice water. We are more insistent upon this all the time. We have never tried the experiment of bringing milk into Boston without ice, as is done in many cities.

We are not averse to pasteurization if it can be shown that it is the best thing. As we said a short time ago to certain members of the Board of Health, if the 500,000 per cubic centimeter bacterial count is insisted upon, it would be almost necessary at certain times in the summer season to pasteurize our milk; but I think we stand today for non-pasteurization, providing we can feel reasonably sure that the present bacterial count will not be insisted upon too strongly. If milk is not to be pasteurized, more effectual work must be put in in the country in order to comply with the rules of the Board of Health.

We are here for information; very much interested in this subject; hoping that something will come out making us feel more strongly whether we shall go to the expense and labor of pasteurizing. If we could believe that pasteurization would prevent an epidemic that might arise through the handling of the milk, such as the epidemic of scarlet fever we have just experienced in Boston, we should at once adopt pasteurization. There would still be an opportunity, however, for milk to be contaminated after being pasteurized; but in the recent scarlet fever epidemic, after thorough investigation, we have yet to find that the source of the epidemic could be positively fixed.

Some of us at this time are expending large sums of money to perfect our plants, adopting the most modern methods of handling milk, and are anxious to know whether the majority of those who are competent to judge are in favor or not of pasteurization. We shall be very glad to hear the discussion.

I would like to mention one safeguard we have recently put on our milk supply. In our contract with farmers we state that in the event of any infectious disease in a farmer's family, or on his premises, we will pay for the milk produced which shall be poured upon the ground each day while in quarantine; so there will be no temptation for a

milk producer to ship milk for one or two days after suspicion of some infectious disease. We look upon this provision as an extra safeguard.

THE PRESIDENT: No man has had a larger experience in measures of control in this State, no man knows more about the subject, no man knows so much about the subject, probably, as Dr. Harrington, and I shall be glad to have him tell you what he thinks about it.

DR. HARRINGTON: Mr. President and Gentlemen: I am, and for a long time have been, very much opposed to the commercial pasteurization of milk, because, as Dr. Norris and Dr. Rotch have said, pasteurization of the public milk supply will put back improvements at the source of the supply; it will encourage dirty habits, because it will be understood by the farmer that it is unnecessary to be quite so particular about cleanliness, since the dirt that gets into it is going to be cooked and made harmless. Again, it will make possible the carrying along of milk until, although not sour, it may become more or less poisonous. I believe that dirty milk should be allowed to stay dirty, so that it will sour the more quickly, rather than that the lactic acid ferments shall be destroyed and the commercial life of the milk be prolonged, thus permitting those organisms which are not affected by heat, and which are believed to elaborate toxic substances, to go on making of the milk dangerous.

There is one point which has been touched upon by Dr. Lederle, which is now regarded as of the very greatest importance and is beginning to receive a good deal of attention, and that is the possibility of infection at the source or in transit through agencies that can, perhaps, hardly be detected until after the mischief is done. I refer to the chronic carriers of the typhoid germ. The case which Dr.

Lederle cites is the first one, so far as I know, that has been run down by any American public health authority, but in Europe they have been looking into the subject for some time. One authority reports having examined 1700 people, among whom he found 23 chronic carriers, and 11 of them had absolutely no typhoid history. In an asylum where a number of cases of typhoid fever had occurred, one after another, and where there was no suspicion of the food supply nor of the water supply, the authorities began examining the patients. They found seven typhoid carriers out of 250 patients. One of these typhoid carriers died of some other disease, and on post-mortem examination, the gall bladder was found to contain a pure culture of the organism and a number of gall stones. In a fair proportion of the cases that have been cited in which a post-mortem examination has been made, the gall bladder appears to have been the source of the bacilli. In some cases the typhoid bacillus has been found in pure culture and in others in mixed culture. I don't know what it is possible to do with this poor woman in New York. She is apparently in good health, but she is a common nuisance and is disseminating the exciting cause of a dangerous disease. I cannot see how it is going to be possible to disinfect her gall bladder, unless it is taken out; and I presume that most of the chronic carriers are in the same condition that this woman is, and that the bacilli are probably in the gall bladder and are being excreted daily.

Somebody spoke of concentrating all the efforts at improvement at the source of the milk. I believe in making improvements, not only at the source, but in transportation, in handling and in storing. In January we had in this immediate vicinity more than 600 cases of scarlet fever, all inside of a week, and nearly all on the same milk route. There was reason to believe that the milk was infected by the man who did the tasting, going from can to can,

taking some of the milk out with a spoon, throwing away the surplus, licking the spoon and dipping it into the next one without any washing. Now, there is a case where it happened in transit. No matter how clean that milk may have been at its source, it would have been infected anyway. During the past two weeks there has been another explosion, this time of diphtheria, in which some 80 cases have occurred in the towns of Milton and Hyde Park and one of the outlying wards of Boston, Dorchester. The cases were all on the milk routes of two men. These two men get their milk from a common source. The wife of the man from whom they got their milk had the care of the milk vessels, washed the tank in which the milk was mixed, and took care of a grandchild with diphtheria, and there can be no possible doubt that the outbreak was due to the infection of one day's supply by that woman. The more these local outbreaks are examined into, the more frequently are they found to be due to contaminated milk, and we have got to enforce cleanliness at the source of the supply, cleanliness in transit, and cleanliness everywhere from cow to consumer.

THE PRESIDENT: This whole subject is before the Association for discussion. I hope that anyone who has a question to ask or an opinion to express will ask his question or express his opinion. We are here to learn.

MR. HOOD: Mr. Chairman and Members of the Board of Health: In the discussion here today very little, if anything, has been said concerning the difficulty of the care of milk in warm weather as compared to its care in cold weather. It was intimated by one speaker that milk to be handled safely should be pasteurized in hot weather on account of its poorer keeping quality at that season. I am inclined to believe that if milk is to be pasteurized for

safety it is more necessary for it to be pasteurized in cold weather than in warm weather on account of the conditions being more favorable to the spreading of disease through milk during the cold season. In hot weather, the farmers at the dairies realize that they must immediately cool their milk, that it must be put into clean cans, and must not be kept around for any length of time. Transportation companies realize the same, and the housekeeper in the city and everyone who has anything to do with milk gives it its greatest care in the hottest weather. When milk changes in hot weather, it is almost always one of souring, and it is well known that there is less danger of ptomaine poisoning from sour milk than there is in the use of milk which has undergone putrefactive changes, which is more often the change taking place during the cold weather.

I have been very much interested in the papers read today, and, as has been previously said, we wish to know what we should do, whether we should arrange to pasteurize the milk or not. From a sanitary standpoint, I believe that a clean milk is more important than a pasteurized milk, and that the Board of Health by sending agents into the country to the dairies, even though they go but once, shows the producers that a better milk is being demanded by the public, as well as the milk dealers. The hardest propositions that we have to deal with in many cases are the producers that have been furnishing milk the longest for the city market; they are the hardest to convince of the requirements of the up-to-date milk business.

DR. ROSE: I would like to ask if dead bacilli are a safe article of diet.

THE PRESIDENT: Dr. Smith, I think you ought to answer that question.

DR. THEOBALD SMITH: Mr. President, it seems to me that the opinion of the meeting today is opposed to pasteurization, and on that account I prefer to say a few words on the other side, not because I am specially convinced that pasteurization is the best thing. It seems to me we must not throw aside pasteurization, because it is the inevitable outcome, I think, of the future. To drink unpasteurized milk is very much like eating our meat raw. We should not think of eating that raw, but we object to the pasteurization of milk. The only difference between the two processes is that we sterilize our meat ourselves just before we eat it, and our milk is to be pasteurized for us some time before we take it. It seems to me that from a bacteriological standpoint the pasteurization of milk will not conceal dirt, for the reason that the bacteria that come from the udder are the ones that will be destroyed, but the bacteria that come from dirt are largely the spore-bearing bacteria, and they will survive. I believe that we could control the quality of milk quite as well after it was pasteurized, by bacteriological counts, than before, because certain species only would go on multiplying, and the indicators would be much better than they are today. If we examine a plate made from milk, for instance, nobody can tell exactly whether the bacteria on that plate are due to dirt or whether they are due to the multiplication of ordinary lactic-acid bacteria, unless a very careful study of that plate be made. As a rule, if nearly all the colonies are alike we assume that they are the result of multiplication. If they are quite different among themselves we assume that there has been a good deal of dirt added to the milk. Now, it seems to me that with the pasteurization it would be possible to control the dirt in the milk much better than it is done today.

You have just heard of a number of instances of epidemics due to milk. Those particular epidemics cannot be abso-

lutely avoided by simple cleanliness. The human bacteria carriers are more or less concealed. They cannot be brought to light by ordinary means. It seems to me that the only way to prevent the conditions that lead to epidemics would be to have certain laws passed which would prevent any person, first,—going into a dairy when in his household there is disease of an infectious character, and secondly, to make a regular medical inspection of the persons working in dairies. Even this scrutiny would hardly disclose all bacteria carriers. It seems to me that the real difficulty of the present condition is the transmission of specific disease germs which are not easily controlled by any amount of cleanliness, and these specific disease germs, one and all of them, may be destroyed by the average pasteurization above 140 degrees F. for 20 minutes.

THE PRESIDENT: Dr. Lederle, I think I will ask you to summarize.

DR. LEDERLE: It seems to me if I were to summarize the situation I would say the necessity for pasteurization on a large scale is the outcome of the neglect of the State and the local authorities to give the people a safe and clean milk supply. I think that is practically what it comes to. Until the state and the local authorities can assure the public of such a safe and clean product, we will have to use pasteurization or any other equally good means to accomplish it.

MR. GRAUSTEIN: Mr. Chairman, I wish to say that I represent two companies, and one of them puts out all pasteurized milk. It is a small company at present. It is putting out about 1,000,000 quarts a month. I am satisfied that the pasteurization of milk is the best thing. In this very epidemic of scarlet fever that is spoken of here, we

did not have a single patient that we supplied when those 600 cases were in Boston and vicinity. I claim that if the milk is properly pasteurized it will destroy all germs. There are various systems of pasteurization. The system we use is one that I invented myself, and I am satisfied that it will kill the germs. But I think pasteurization should be done as soon as milk is drawn from the cow. To carry my idea of pasteurization further I am now establishing a local pasteurizing plant where my supply comes from in the country, and I expect inside of fifteen months to pasteurize the most of my milk that comes from a distance in the country. I have one establishment now where the milk is milked and at once brought to the plant and pasteurized, and in that establishment the milk gives very low bacteria count. By pasteurizing it there and then sending it on a long transportation the bacteria count does not grow. I should think that there is not anything quite so safe for the public of a large city as a pasteurizing plant at the other end, where the milk can be pasteurized as soon as possible after it is drawn from the cow.

DR. LEDERLE: I would like to say that when I used the term "neglect" I wanted to convey the thought that the authorities are not sufficiently "backed up," so to speak, by the public. They have not sufficient means, as a rule, to carry out these improvements. But I still insist that a great deal of the work should be done through the state and the municipal authorities, and when that work is done as it should be done, it seems to me that the necessity for pasteurization will be practically removed—perhaps not entirely, but practically so. In all these matters we should try to be practical. I will give you an illustration. About two years ago I was consulted by a large milk concern in New York, supplying perhaps over 200,000 quarts of milk a day to the poorest sections in the city. I knew what their

conditions were. They obtained their milk from perhaps 1800 farms, over which they had no supervision. I recommended that they should install pasteurization plants. They erected them in the city at a very large expense, perhaps $60,000 or $70,000. The conditions under which they labored were such that it seemed to me this was the very best advice that could be given, and I will add that I very reluctantly gave them that advice. What I should like to have seen them do would be to be able to control every one of those farms so thoroughly that they would produce a quality of milk which Dr. Rotch here to my right would approve of for infant feeding. But it was simply out of the question. They had neither the support from the State authorities or the local authorities, nor was it possible for them to increase the price of that milk, 240,000 quarts a day, by a fraction of a cent without causing a great deal of trouble, and probably misery, among the thousands of families that they supplied. Now, here was a practical proposition, and I would like to ask any one in this room to suggest some better method of attaining the same results that we did in that particular case by any other method. I would be very glad to hear opinions on this. I would like to say that what was accomplished was that the milk was taken to stations which it was possible to put under control of men of a very much higher grade than is usually found in the small creameries in the country. It was also possible to have machinery by which the utensils could be thoroughly washed and thoroughly sterilized, something that had never before been done by this concern, and which of course should have been done from the beginning. The milk, therefore, was placed under very much better control. The 240,000 quarts were distributed to the poorest people in the city of New York, the cans and utensils were thoroughly sterilized, every drop of this milk was filtered and pasteurized at a low temperature, and the dealers were able

to sell it at a price which did not require the advance of even one cent a quart. What confronted us was a hard practical problem, and I would like very much to hear from any one in the room of a better solution.

DR. ROTCH: I think each case is a problem to itself. Dr. Lederle is right. But that is no reason we should take a special case as any argument whatever for passing a general law, as there are a very large number. You did not mean that, Doctor, did you?

DR. LEDERLE: Oh, no.

DR. ROTCH: That is what I mean. Of course take each case, each city, each town, inspectors or health boards understand each in their individual place what is needed.

DR. HARRINGTON: Mr. President, I understood Dr. Lederle to say in his case that there were some 1800 farmers who were absolutely beyond the control of a concern that was dealing in the milk.

DR. LEDERLE: Practically so.

DR. HARRINGTON: And that the local authorities and the state authorities would not do anything.

DR. LEDERLE: Well, they could not do it for an individual. They were not making general inspections. These farms were located in, I think, three different states, if not four.

DR. HARRINGTON: That is to say, they were beyond the control of the state authorities.

DR. LEDERLE: Well, not entirely, not if the state

authorities had a proper system of supervision, which they should have.

DR. HARRINGTON: I mean those that were outside the state were beyond their jurisdiction.

DR. LEDERLE: They were under the jurisdiction of some other state, and there is no reason why that other state should not have the same care of its milk supply as our own.

DR. HARRINGTON: If you did not have the backing of the local authorities nor of the state authorities, of course there was nothing to do but to proceed as you did.

DR. LEDERLE: Practically not.

DR. HARRINGTON: But when you have got the backing of state authorities or local authorities, you don't need to do that at all.

DR. LEDERLE: When you get to that point I agree with you absolutely.

DR. HARRINGTON: In this State some local authorities are co-operating with the State authorities in trying to secure a clean supply. When the milk supply of Springfield, for example, was examined something more than a year ago, the inspector for the State Board of Health had to go down into Connnecticut, and he examined every farm in Connecticut that was sending milk up to the Springfield market. Every one of those men who had a dirty place or was following dirty processes received a letter from the State Board of Health, telling him what he had got to do if he was going to ship any more milk into Massachusetts. In a short time the inspector

went down again and looked over the premises, and found that part of them had not done what they were told to do. The authorities at Springfield were communicated with, and they prohibited bringing that milk into the city, and the Connecticut farmers who were not willing to keep clean could keep their milk; they could not bring it into Massachusetts. Day before yesterday, 41 farmers over the line in New Hampshire got the same sort of a notice, and the Board of Health of the city of Boston was informed of the fact that these men had been notified to make certain changes; and the contractor who buys their milk and receives it here was notified. I know what he is going to say to them. He is going to say, "If you don't do what you are told to do, you can't ship any more milk into this market." I am already hearing from these New Hampshire men, and they say, "We are cleaning up. We are going to get our places in proper shape, so that we can continue to send milk to Massachusetts." That is the way to do it. Those within our own jurisdiction can be taken care of. They are not ordered, because we have no right to order them, but it is suggested to them that they do certain things, and the local authorities are requested to see that those suggestions are carried out, and if they refuse to carry them out the local authorities, many of them, prohibit the sale of the milk, pass regulations concerning the production, handling and sale of milk, and prohibit the introduction of any milk that does not conform to the regulations.

DR. LEDERLE: Don't misunderstand me, Doctor. That is what New York is trying to do.

DR. HARRINGTON: I understand that that is what they are trying to do now.

DR. LEDERLE: But the problem is such an enormous one that it is going to take a long time, even with unlimited money,

to get around to all of them. Remember that the experience I referred to occurred almost two years ago. If that particular company had attempted to get special co-operation with either the State or the local authorities, and had special inspections made which were not being made generally throughout the dairy districts, most of those farmers would have left this company and would have taken milk to those creameries that were not under such strict control. The inspection must be general.

DR. HARRINGTON: Yes, I understand that.

DR. LEDERLE: In the meantime, if the dealers had not pasteurized their milk, that particular supply would still be coming in and would have come in for those two years, without any special supervision. Now, the question is, did the public derive any benefit through that system of pasteurization during those two years? I would like to say that when I gave them that advice I also told them that it should not absolve them from the responsibility of the conditions existing on those farms, and that care must be exercised in order to produce proper conditions, and that the fact of pasteurizing the milk should not stand in the way of reducing the existing evils. That is the position that I take now.

DR. HARRINGTON: I would like to ask Dr. Lederle if many examinations have been made of pasteurized milk as it is sold.

DR. LEDERLE: Yes, quite a good many.

DR. HARRINGTON: And is the bacterial count low?

DR. LEDERLE: Not always, no. You said a little while ago that if pasteurization is used rather generally it will have the effect of making the farmer more careless in the production of his milk.

DR. HARRINGTON: I said that he would have an excuse for beginning.

DR. LEDERLE: It will tend that way. But if you have the power now, and the funds to exercise proper supervision of the milk at its source, you ought to maintain the inspections just the same, whether the milk is being pasteurized or not. You are to determine that, not the farmer. Of course the farmer will be more lax if he thinks the milk is going to be pasteurized, but the authorities should not be any more lax.

DR. HARRINGTON: True.

DR. LEDERLE: It should not be left to the farmer.

DR. HARRINGTON: The reason I asked about count is that a large number of samples of milk taken in Boston from a concern which pasteurizes its milk revealed the fact that that milk yielded a larger bacterial count than the average milk that was not pasteurized. Where, before the process of pasteurization was started the average of the samples of that concern may have been, say 200,000, after they began to pasteurize it ran up into the millions. The fact is, the milk was simply heated and then was not properly cooled. In other words, the milk was heated to such a point as to make it a little more favorable breeding ground, and much more rapid multiplication took place. I fancy that that is the kind of pasteurization that we would be very likely to see, unless it was all done under some competent supervision.

DR. LEDERLE: I think the same supervision ought to be exercised over pasteurized milk as in the care of raw milk.

DR. HARRINGTON: There was another point that Dr.

Lederle made, with reference to compulsory pasteurization in Denmark. If there is a law requiring the pasteurization of milk in Denmark it must have been passed within a year and a half, or else it is not enforced. In Copenhagen there are two very large milk contracting concerns. One of them advertises that it pasteurizes its milk, and the other one issues circulars all over the city that it does not, and every bottle that it sends out has the disadvantages of pasteurization set forth. One prides itself on the fact that it pasteurizes, and the other, in competition, prides itself on the fact that it does not need to.

DR. LEDERLE: You can take your choice.

DR. BURR: Coming back to the question of the pasteurization of milk, what is the ordinary listener here to conclude today from what he has heard? It seems to me that after you have got the cleanest milk possible, and all these farms in the cleanest condition, there is only one thing to do, to pasteurize the milk after you have had it in a thoroughly clean condition. I am only judging from what we have heard today. I don't know what the ordinary listener can really conclude from what we have heard. All the milk, after it is pasteurized is still ready to transmit contagious diseases.

THE PRESIDENT: The Association, fortunately, has as its guest today a representative of a health board on the other side of the Atlantic, the country that has shown the way, opened the way to sanitary control. I am going to ask Dr. Tattersall if he won't say a word or two to us.

DR. TATTERSALL: Mr. President and Gentlemen, I should say that I am in this country on the errand of learning how to procure a pure milk supply, so that I need hardly

tell you how great a privilege I feel it to be present at this interesting discussion today, and I feel especially indebted to my friend, Dr. Harrington, for the opportunity that I have just had. The milk question is agitating the minds of all people interested in public health on our side of the water, as it is evidently on this side. We have the impression that on your side you have already solved the problem, and I must say that on landing in this country I was rather surprised to find that every one interested in public health whom I had the pleasure of meeting was full of the pure milk question, and that it was not solved, but that it was only in process of solution. You are, I feel convinced, much further on the way towards a satisfactory solution than we are. But I must admit that it came as a great surprise to me that this meeting was this afternoon to consider the question of pasteurization of milk. We have had this question discussed and discussed, and I think we have relegated it finally, at least I hope so, to the limbo of those things which we never want to hear of again. As a general proposition, to cover the whole of a milk supply, I think it is an unsatisfactory and a very feeble way out of this very important subject. The essentials are that our milk shall be pure, and that it shall be well regulated, and what is wanted is that the state and the public health authorities, combining with the trade interests of the milk vender and the farmer, all giving fair consideration to all interests, should still obtain a supply of milk that can be guaranteed as free from danger to any one. I don't see why in the progress of a few years this should not be obtained. I have heard a great deal since my coming to this country as to the methods and the conditions of your farms, the methods of farming and the methods of inspection, the way in which you deal with milk in transit and in delivery, and I must say that on the whole, you are enormously in advance of the old country in this matter, and I am taking back, I hope, some information that may prove

useful to us.

(On motion of Mr. Coffey, the Association then adjourned.)

COMMUNICATIONS.

FINGER PRINTS AND THE VITAL STATISTICAL RETURNS.

[From ALBERT C. NYHEN, *Assistant Bacteriologist,* Brookline Board of Health Laboratory.]

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A word about finger patterns:—There are ridges in the skin on the bulbs of the fingers and thumbs which are present at birth and remain distinct until the decay of the skin after death.

These ridges are of a distinctive pattern on each finger and are constant during life. These ridge patterns can be differentiated from each other in the digits of an individual, likewise the patterns of individuals can be differentiated from those of another person, thereby eliminating the possibility of error by duplication. These ridge patterns have well defined and recognized characteristics which furnish abundant minute reliable

data to compose a formula for purposes of classification and filing.

A skilled classifier of finger prints formulae can differentiate between various formulae and finger prints as rapidly and as skilfully as a bank teller can differentiate and count a pile of bank notes.

Without having finger print originals, at birth to start with, a limited number of identifications later in life can only be made, and is then of value only in distinguishing between individuals whose prints have been obtained for various specific reasons.

The best means for obtaining abundant finger print material for future reference work is through the registrar's returns of the vital statistics. Not only can a large amount of reliable basic data for future identifications at large be obtained, but it will serve the immediate local purpose of authenticating hereafter the person or persons named in a document submitted for registration.

The data fixing the identity of a person should be obtained as early in life as possible; therefore at birth, finger prints should be returned on the birth certificate (of the subject reported). This done, the individual is traceable through life.

The means (finger prints) of recognition are constant during life and also until a short time after death. The system is accurate, simple of application, also admitting of rapid and easy interpretation.

John Doe may change his birthname to Richard Roe when he marries; to John Smith if he ventures bigamy, and may die in some distant insane asylum as John Jones, but if his finger prints are on record, he will be identified anywhere under whatever name, dead or alive, as the original John Doe.

The time is not far off, when it will be found absolutely necessary to obtain finger prints at stated periods in the life of a person. These prints will be required at birth to start a person's accurate life history with the community, and at death to definitely close his career.

The registrar's returns of the vital statistics afford with little trouble, the best opportunity for obtaining the primary and early identification and registration of a person's existence; likewise the death certificate also furnishes an excellent chance to secure for record the finger prints of the deceased.

There can be no objection to the use and application of this system on the grounds of social or class, religious or sexual differences.

[A series of newspaper clippings was submitted, showing where lack of identification resulted in lawsuits, indictments for various offenses and much confusion, delay and ultimate uncertainty. Ed.]

CHEMICAL LABORATORY NOTES.

By Franklin C. Robinson.

Professor of Chemistry, Bowdoin College, Brunswick, Me.

STANDARDIZATION OF DISINFECTANTS.—Since Rideal and Walker proposed a method for standardizing disinfectants by comparing them with carbolic acid, and thus getting their carbolic acid coefficient, as they called it, others have repeated and extended the work, and found certain things which must be taken into account if such coefficients are to be practically useful.

First, M. Winter Blyth found that organic materials and especially milk interfered with the uniformity of the results.

Harris and Praüsnitz* have confirmed Blyth's work, and propose a material, made from urine and feces, to be used in all standardization experiments. They prepare this as follows:

Solid feces are shaken with distilled water and strained through a sieve of 30 meshes to the inch. This gives an emul-

*Journ. Royal Inst. Pub. Heal., March, 1907.

sion containing solid particles closely imitating average substances to be disinfected in practice. This emulsion is then tested for its oxygen consuming value and diluted until this value is equal to a double normal solution of potassium permanganate. Human urine is then taken and its oxygen consuming value determined, and diluted until this is equal to .4 normal potassium permanganate. These solutions are kept separate until wanted and then equal volumes taken for the test substance.

They found in the case of typhoid bacillus that in this mixture the carbolic acid coefficients of disinfectants were only about one-half what they were found by Rideal and Walker. They also noticed, what H. D. Evans of the Maine Laboratory of Hygiene had previously found, that in getting the coefficients of some disinfectants, notably of the mercury compounds, great care must be taken not to carry into the medium in the final plating traces of the disinfectant, which will inhibit the growths to a marked degree and make the results inaccurate. This is easily obviated by putting the loop of material first into considerable sterilized water, and then plating from this. It is to be hoped that other laboratories will take up this matter and thus a standard technique be developed which will give reliable results.

FORMALDEHYDE DISINFECTION AS AFFECTED BY HUMIDITY AND TEMPERATURE.—Experiments by H. D. Evans in the Laboratory of the Maine State Board of Health* show that a room must have an initial humidity of at least 50 for efficient action of the gas. If this humidity is maintained the question of temperature is of little importance, but at temperatures below 65 degrees F. polymerization takes place with the formation of a solid which removes much active gas from

*Bulletin for March, 1907.

the room and consequently diminishes the disinfection. He found that it is much better to have this humidity before the gas was liberated than to depend on the water in the formalin to produce it.

His conclusions are that with the permanganate method, and proper humidity, even in a room only 65 degrees F. efficient disinfection can be obtained with only one and one-half hour's exposure.

It is interesting thus to see the rapid development of formaldehyde disinfection, the rapid simplification of it, since that Buffalo meeting of the American Public Health Association, in 1893, when the first practical apparatus for its use was exhibited by the author of these notes. As in so many other cases, the first development was in the line of complexity, but then a simplification followed which has continued until now. The next development of room disinfection should be to find some harmless and inoffensive material which can be applied to a room surface and keep it disinfected permanently or for a long time, something which will catch the germs as they are dust-borne into a room and thus take away the necessity for these spasmodic and generaly ineffective disinfections which partake of the nature of locking the stable door after the horse is stolen.

DETECTION OF FOREIGN COLORS IN WINES.*—50 c.c. of the wine are treated with 1 c.c. formalin and 4 c.c. conc. hydrochloric acid, and the mixture heated in the water bath until the precipitate forms. The solution is then made alkaline with ammonia and all excess of ammonia expelled by further heating in water bath. Cool and filter. With natural wines the filtrate is colorless, but with artificially colored wines the color remains.

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*Ann. Chim. Anal., 1907, 12.

DETECTION OF CANE SUGAR IN MILK AND CREAM.†—Mix 15 c.c. of milk or cream with .1 gram resorcin and 1 c.c. conc. hydrochloric acid and heat to boiling. In presence of cane sugar a fine red color is produced, while pure milk turns brownish; .2 per cent. can thus be detected, according to the author. Levulose gives the same reaction, but glucose does not.

PERSONAL HYGIENE.

By Percy G. Stiles, S.B.,

Instructor in Physiology, Massachusetts Institute of Technology.

THE REACTION TOWARD LIBERAL FEEDING.—It is now two years since Chittenden's "Physiological Economy in Nutrition" was published. The experiments there recorded presented a mass of evidence which seemed to show conclusively that the standard diets of earlier writers, with their average protein content of 100g and their fuel values approximating 2500 Cal., might be greatly cut down with none but favorable effects upon the strength and well-being of the subjects. A reduction of the protein from 100 to 50g and of the fuel value from 2500 to 1600 Cal., was strongly recommended. The scientific arguments of Chittenden have been repeated in popular form by Horace Fletcher, the best-known advocate of the lenten diet.

Howell, in commenting upon these views in his "Text-book of Physiology," (1905), expressed doubts as to the policy of long-continued low feeding, holding that the instinctive

†H. W. Anderson, Analyst, March, 1907.

choice of all races can hardly be vicious and laying stress on the fact that abundant feeding, especially of protein, certainly helps to combat tuberculosis and other infections.

The first extended criticism of Chittenden's teaching has come from Benedict (American Journal of Physiology, Vol. XVI., August, 1906). It gathers a formidable array of evidence in favor of something like the older and more generous rations. It is pointed out that Chittenden's most brilliant witnesses have proved to be back-sliders when released from their obligations to eat lightly. It is shown that with sparing protein feeding the absorption from the intestine is less complete than with a somewhat larger supply. A minimal diet may thus weaken the digestive powers and mischief from unabsorbed residues may occur as a result of the very stinting undertaken to avoid it. This would seem to be still more likely from the constipation produced by Fletcherism.

Benedict cites interesting facts which have just been made known in Japanese publications. This Eastern race has often been described as one which has accomplished great things upon a habitually meagre diet and with its protein especially limited. It is now shown that the Japanese ration is not very small for the stature of the people, and that it is being increased in the navy with marked advantage. The adoption of European standards of feeding has lessened the amount of sickness—particularly of beri-beri—to a very gratifying extent.

Reports from several Agricultural Experiment Stations (e. g., Minnesota), state that the effect of low protein feeding upon live stock is most unfavorable, but that the evil results are long deferred, becoming apparent only in the second or third years of the regimen. Benedict, therefore, suggests that while the reduced diets were not seen to do harm to the various volunteers at New Haven, malnutrition might ensue if the course were prolonged and that a real demand

for more nutriment explains the lapses of many of these men into their old habits.

Benedict accounts for the maintenance of the body-weight, which is sometimes surprisingly good upon a slender diet, as being due to the accumulation of water in the tissues in place of oxidized fat. There must be a limit to this substitution, but it is well worth taking into account. An experiment made upon Fletcher in Benedict's calorimeter showed that the metabolism of the subject was 25 per cent. in excess of his own estimate, based on the assumption of equilibrium between income and outgo. In other words, his diet was not a sufficient one, at least for that day, and the waste of his adipose tissue which must have occurred was disguised by a slight increase of water representing weight, but not energy.

Meltzer has scored the ideal of the minimal diet in an original and suggestive article in "The Journal of the American Medical Association (Feb. 23, 1907). He shows that almost every organ of the body has much more substance than is absolutely required for its work. One kidney, one lung, a large part of the intestine may be dispensed with. If this is true, then the risk of over-taxing these organs by enjoying an old-fashioned diet can hardly be so great as has been claimed. Meltzer thinks that a reasonable surplus of food is as natural as the surplus of liver-substance so liberally provided by nature. To live on as little food as possible, he says, may be no more normal than to live with one kidney. Because one kidney will answer it does not follow that two will not work better, and because 1600 calories will sustain life and strength, we need not deny all utility to extra fuel supplies.

VETERINARY HYGIENE.

By Veranus A. Moore. B.S. M.D.

Professor of Comparative Pathology Cornell University, Ithaca. N. Y.

THE SECOND INTERIM REPORT OF THE ROYAL COMMISSION ON HUMAN AND ANIMAL TUBERCULOSIS.—This is the second report of the Commission appointed soon after Koch read his famous paper on tuberculosis at the International Tuberculosis Congress in London. The questions before the Commission upon which they have now reported are:

1. Whether the disease in animals and man is one and the same?

2. Whether animals and man can be reciprocally infected with it?

3. Under what conditions, if at all, the transmission of the disease from animals to man takes place, and what are the circumstances favorable or unfavorable to such transmission?

The general conclusions which they draw from their investigations are:

"There can be no doubt that in a certain number of cases the tuberculosis occurring in the human subject, especially in children is the direct result of the introduction into the human body of the bacillus of bovine tuberculosis, and there also can be no doubt that in the majority, at least, of these cases the bacillus is introduced through cows' milk. Cows' milk containing bovine tubercle bacilli is clearly a cause of tuberculosis, and of fatal tuberculosis in man.

Of the sixty cases of human tuberculosis investigated by us, fourteen of the viruses belonged to Group 1, that is to say, contained the bovine bacillus. If, instead of taking all

these sixty cases, we confine ourselves to cases of tuberculosis in which the bacilli were apparently introduced into the body by way of the alimentary canal, the proportion of Group I becomes much larger. Of the total sixty cases investigated by us, twenty-eight possessed clinical histories, indicating that in them the bacillus was introduced through the alimentary canal. Of these, thirteen belonged to Group I. Of the nine cases in which the cervical glands were studied by us, three, and of the nineteen cases in which the lesions of abdominal tuberculosis were studied by us, ten belong to Group I.

These facts indicate that a very large proportion of tuberculosis contracted by ingestion is due to tubercle bacilli of bovine source.

A very considerable amount of disease and loss of life, especially among the young, must be attributed to the consumption of cows' milk containing tubercle bacilli. The presence of tubercle bacilli in cows' milk can be detected, though with some difficulty, if the proper means be adopted, and such milk ought never to be used as food. There is far less difficulty in recognizing clinically that a cow is distinctly suffering from tuberculosis, in which case she may be yielding tuberculous milk. The milk coming from such a cow ought not to form part of human food, and, indeed, ought not to be used as food at all.

Our results clearly point to the necessity of measures more stringent than those at present enforced being taken to prevent the sale or the consumption of such milk."*

These findings differ considerably from those heretofore reported in this country in the proportion found to be of bovine origin.

INFECTIOUS ABORTION IN CATTLE.—In the *Journal of Comparative Pathology and Therapeutics,* 1906, Bang dis-

*The Vet. Journal, April, 1907.

cusses the methods of preventing this disease based upon the theory of its etiology elucidated by him some ten years ago. It is his opinion that where the nature of the disease is understood by the cattle owners they may readily protect their herds against it by proper sanitary precautions.

During the past three years he has carried on experiments in attempting to immunize cows, sheep, and goats against the disease. It has been observed that aborting cows acquire a certain degree of immunity. In this work intravenous injections of serum boullion cultures of the micro-organism of abortion were adopted. In some cases this treatment produced abscesses and other symptoms of reaction, but considerable immunity resulted, and Bang hopes that this method of vaccination will ultimately give a means of controlling the disease.

IMMUNIZATION TOWARD ANTHRAX. *Zeitschrift fur Hygiene und Infek. Krankheiten,* 1906, Murillo has proposed a new method for vaccination against this disease. His method is based upon the antagonism between bacteria or higher plants which are growing in the same medium. He found that diphtheria toxin had the power of attenuating anthrax bacteria. His experimental tests gave results which indicate that this method may be used quite successfully.

He claims certain advantages for his method over the Pasteur system. According to the latter method a temperature of 42 degrees C. is recommended for the attenuation of the anthrax vaccine. By Murillo's method any temperature up to 37 degrees is satisfactory. It was also found that it is not necessary to use the cultures on a certain day, but that they remain suitable for a number of days after treatment. By combining cultures and toxins in different proportions in ordinary bouillon it is possible to obtain a wide series of gradations in the vaccine.

PREVENTIVE THERAPEUTICS.

By Herbert D. Pease, M.D.

Director of the Antitoxin Laboratory, New York State Department of Health, Albany, N. Y.

THE TETANUS ANTITOXIN UNIT.*

A new American standard for tetanus antitoxin has been devised by a committee of the Society of American Bacteriologists, composed of Drs. J. J. Kinyoun, chairman; W. H. Park, secretary; M. J. Rosenau, E. M. Houghton, Joseph McFarland, and H. D. Pease.

Work upon this subject has been carried on in the Antitoxin Laboratory of the New York State Department of Health for the last four years, and a method of testing the strength of tetanus antitoxin has been in use for two years, which is similar in most respects to that now adopted by the committee and made official for interstate commerce by the United States Public Health and Marine Hospital and for this State by the State Department of Health.

The old New York State unit was ten thousand times the least amount of serum necessary to protect from symptoms of tetanus, guinea pigs weighing from 300 to 350 grams, when injected with 100 times the minimum fatal dose of a standard liquid toxin for guinea pigs of the same size.

Average serums put out by the Antitoxin Laboratory contained from one-quarter to three-quarters of a unit per cubic centimetre. As the new unit is but ten times the least amount of serum necessary to save the life of the guinea pig against 100 minimum fatal doses of a precipitated toxin the old unit was approximately equal to 1,000 of the new units, and the serum issued by the New York State Antitoxin Laboratory therefore contained approximately 250 to 750 new standard units. It has been customary to distribute immunizing doses

*Bulletin N. Y. State Dept. of Health, February, 1907.

of 10 cubic centimetres of the weaker serums, and according to the new standard these doses therefore contained approximately 2,500 to 5,000 of the new units of tetanus antitoxin.

The committee have recently voted to reduce the amount of the minimum immunizing dose from 3,000 units to 1,500 units. Hereafter the immunizing doses issued by the Antitoxin Laboratory of this Department will contain 1,500 units of tetanus antitoxin irrespective of the amount of serum present in the vial. However, for the present at least, the amount of serum required will be less than formerly issued as an immunizing dose.

The therapeutic doses of tetanus antitoxin will contain 10,000 of the new units.

As the prophylactic doses of tetanus antitoxin which have been issued for the last two years contained a considerable excess over the 1,500 units now distributed as an immunizing dose and as the loss of antitoxic strength in tetanus antitoxin serum proceeds slowly, the doses formerly issued and not used undoubtedly still contain more than 1,500 units.

PROPHYLACTIC USE OF TETANUS ANTITOXIN.*

Immunizing doses of 1,500 units should be administered to all persons who have been so injured that garden earth, manure, street dust, sand, or other dirt has been carried into the wounded tissues. Such persons are frequently infected with tetanus bacilli in this way and as the subcutaneous administration of a prophylactic dose of tetanus antitoxin is practically a sure method of preventing the development of tetanus intoxication in these cases, this procedure should always be followed. *Every person contracting a Fourth of July injury should receive as a part of the treatment of the case a subcutaneous injection of* 1500 *units of tetanus antitoxin.*

No instance of serious tetanus intoxication has ever followed this method of immunization in this country.

*Bulletin N. Y. State Dept. of Health, February, 1907.

PUBLIC HEALTH LEGISLATION, NEWS AND NOTES.

By F. H. Slack, M.D.

Assistant Director, Boston Board of Health Laboratory.

RESOLUTIONS REGARDING THE MILK SUPPLY.*—The Section on Public Health of the New York Academy of Medicine passed the following resolutions at its meeting of March 12, and these resolutions were adopted by the Academy at its meeting on March 21:

Resolved: (1) That the Section on Public Health of the New York Academy of Medicine does not believe in the necessity of the compulsory pasteurization of all of the milk supply of New York City, but recommends for the present to all those whose milk supply cannot be proven to be thoroughly inspected and wholesome, and mainly the milk destined for the feeding of infants, unless it is "certified," to boil their milk when delivered in the morning for three minutes.

(2) That the health of the city of New York demands a persistence in the policy of supervision of farms, dairies and creameries, supervision of the milk during transit and on delivery in the city, and supervision at the points of distribution in the city to the consumer, whether the milk that is distributed has been pasteurized or not.

(3) That local and state health authorities and the Bureau of Animal Industry of the United States Department of Agriculture should co-operate with milk producers to prevent the occurrence of communicable disease in cattle and their caretakers.

(4) That the Section on Public Health recommends that the New York Academy of Medicine adopt the above resolu-

*Medical Record, March 30, 1907.

tions, and that a copy be sent to the members of the Committee on Public Health of the Board of Aldermen, to the Committee of the New York State Legislature having under consideration the Reece bill, and to the medical and the lay press.

A NATIONAL HEALTH DEPARTMENT.*—In a paper read before the American Association for the Advancement of Science, at its last meeting, Dr. J. Pease Norton, assistant professor of political economy at Yale University, points out how little is appropriated from government expenditures for the preservation of the public health and advocates the establishment of a national department of health, with its head a cabinet officer, and gives rather elaborate details of the plan on which it might be organized. The economic reasons advanced for such establishment are:

(1) To advance the progress of society by the increased percentage of exceptional men in addition to the general increase of population. (2) To lessen the burden of unproductive years by increasing the average age at death; he figures that an increase of five years would save from $800,000,000 to $1,600,000,000 per annum. (3) It would also decrease the burden of death on the productive years. And (4) It would lessen the economic burden of sickness. Could the days of illness be cut down one-third a saving of nearly $500,000,000 could be made. It is estimated that $600,000,000 are now spent on criminality in the United States. If this is largely due, as is claimed, to social environment, such as overcrowding, alcoholism, etc., a fractional diminution would be of the greatest value.

At the meeting of the American Public Health Association lately held in the city of Mexico a strong sentiment in favor of a United States Department of Health was mani-

*Bulletin of the State Board of Health of Maine, January, 1907.

fested, and action was taken for forwarding this consummation devoutly to be wished for. The same kind of feeling was expressed by the Mexican and Canadian delegates, in regard to their own countries.

DOCTOR OF PUBLIC HEALTH.* The House of Delegates of the New York State Medical Society, Jan. 28, 1907, recommended that the Regents of the State University provide courses for and create the degree of Doctor of Public Health and that the State should enact a law making only such as have this degree eligible to appointment as Medical Health Officers.

MISUSE OF MILK CANS.† Massachusetts now has a law prohibiting the misuse of vessels used in the sale of milk and providing penalties in case such vessels are found to contain any offal, swill, kerosene, vegetable matter or other offensive material.

CALIFORNIA'S NEW HEALTH LAWS. The California Legislature, which has recently adjourned, passed pure food laws nearly identical with the national law. This legislature also passed an anti-spitting law and a law requiring the reporting, by physicians, nurses and others of all communicable diseases, including pulmonary tuberculosis.

A bill appropriating $2,000 to disseminate knowledge as to the best means of preventing the spread of tuberculosis awaits the Governor's signature.

ANTIVIVISECTION AGITATION IN ILLINOIS. Illinois is threatened with an antivivisection law, a bill to this effect having passed the Senate, April 10. It is to be hoped that the protests of all who are interested in the progress of our knowledge along those lines which have proven in the past to be of so great a benefit to both man and beast, will avail to defeat such legislation wherever it may be attempted.

*Monthly Bulletin, New York State Department of Health, March, 1907.
†Laws of Massachusetts, Acts of 1906, Chapter 116.

REGISTRATION OF CASES OF TUBERCULOSIS. New York, The State of New York Department of Health, beginning with the first of this year, requires the registration of every case of tuberculosis.

ANTI-SPITTING LAW, VERMONT.* Vermont has passed an anti-spitting law with a fine of not more than ten dollars for each offence.

ANTI-SMOKE ORDINANCE, ATLANTIC CITY. Atlantic City, N. J., has an Anti-Smoke Ordinance which passed the city council Sept. 10, 1906, and was signed by Mayor Stoy, Sept. 17, 1906.

IMPURE ICE LAW, NEW YORK. New York has now before the Assembly and Senate Committees of Public Health an act prohibiting the cutting and sale of ice from impure or contaminated sources.

CLAMS FROM CONTAMINATED WATERS, MASSACHUSETTS. The Massachusetts Legislature has passed an act authorizing the taking from contaminated waters of clams and quahaugs for bait and providing heavy penalties if such clams or quahaugs are sold or exchanged.

MUNICIPAL SANITATION.

By Charles V. Chapin, M.D.

Superintendent of Health, Providence, R.I.

ISOLATION IN SMALL-POX TO BE ABANDONED.—The following resolution was adopted by the State Board of Health of Minnesota at its July meeting, 1906. Health

*Laws of 1906, Act No. 187.

officers elsewhere will anxiously await the results of this experiment in placing the responsibility for the extension of small-pox where it properly belongs, on those who refuse or neglect vaccination:

"It having been established that small-pox will not spread in a well-vaccinated community, and believing that all attempts to restrain small-pox in a community not protected by vaccination by means of quarantine will fail; that quarantine in a well-vaccinated community is unnecessary, that attempts to control the spread of small-pox by quarantine is unscientific, irrational, expensive, and misleading, that in laying down strict rules for the quarantine of small-pox, sanitary authorities are favoring unscientific and illogical methods for its control, and are conveying false ideas as to the safety of the public, the Minnesota State Board of Health advises that after January, 1908, further attempts to control small-pox in Minnesota by means of quarantine shall be abandoned."

TREATMENT OF CONSUMPTION AT A HOSPITAL FOR CONTAGIOUS DISEASES.—In 1902, Dr. Newsholme* began to receive a few tuberculous patients at the isolation hospital. Cases were selected which would probably be benefited by a few weeks' care and rest, so that they might then be able to return to work. The result has been very satisfactory and the number of patients treated has steadily increased, until in 1906, 181 persons had the benefit of the treatment. There is room for twenty-five patients at one time. The educational influence of this plan has been very great and Dr. Newsholme considers it the most important factor in the municipal control of tuberculosis. The tuberculosis pavilion is located about 100 feet from the diphtheria ward, and there has never been any cross infection, a fact which speaks well for the administration of

*Report of the Medical Officer of Health of Brighton, Eng., 1906, p. 76.

the institution. Brighton has a population of about 130,000. At North Brother Island in New York, there is a consumption ward parallel to and about thirty feet distant from a diphtheria ward, but no bad results ensue.

FOOD TO BE PROTECTED FROM DUST.—The City of New York has for some time had a provision in its sanitary code that no meat, fish, fruit, confectionery, bread, etc., should be offered for sale in the streets unless securely covered from flies and dust. But experience has shown that it is very difficult to enforce this regulation and that many fines and much confiscation has had little effect in reducing the number of violations.†

DISCHARGE OF DIPHTHERIA PATIENTS FROM HOSPITAL.‡—It is only within a year or two that the London hospitals have required negative cultures before the release of diphtheria patients. Dr. Turner states that of 1325 patients discharged under the new rule, sixteen apparently carried the infection to their homes, or 1.21 per cent, while of 1655 discharges before cultures were required, the percentage of "return cases" was 0.91.

NO DANGER IN SCARLET FEVER DESQUAMATION.*—Some of the London hospitals discharge their scarlet fever patients without any reference to desquamation, but all such require that there shall be no inflammation of throat, nose or ear. Other hospitals attach the greatest importance to desquamation and do not discharge a patient while it continues. Of 6164 cases sent from the latter class of hospitals, 3.97 per cent. carried infection to their homes. Of about 12,000 cases discharged from the

†Report of the Department of Health, 1904, I., p. 143.
‡Dr. Turner's Report to the Asylums Board on Return Cases of Scarlet Fever and Diphtheria in 1902-4, p. 20.
*Dr. Turner's Report to the Asylums Board on Return Cases in 1902-4, p. 6.

hospitals where no attention is paid to desquamation, and of which a large number were desquamating, 2.24 per cent. proved infective.

MILK NOTES.—The reports of the Board of Health of Montclair, N. J., always contain the results of the chemical and bacterial examination of milk samples from each dairy company, taken monthly. A short note is also added, giving some account of the way in which the dairy is managed. This seems to be an excellent plan for keeping the public informed as to the character of the milk supply and enabling them to select a good dairy man. It, of course, would not be feasible in a large city.

On April 6, 1904, an ordinance was passed by the City Council of Chicago which required that every can of milk brought into the city must be sealed by the shipper. It was believed that in this way responsibility for tampering with the milk could be more easily fixed. The results were very satisfactory, for it is stated that the watering of milk was reduced by at least 50 per cent. (Report of the Department of Health of the City of Chicago, 1904-1905, p. 17.)

SANITARY ENGINEERING NOTES.

By Robert Spurr Weston.
Assoc. M. Am. Soc. C. E.

REPORT ON POLLUTION OF THE WATER SUPPLY OF PHILADELPHIA BY COAL WASTES.*—In 1904, 5,809,000 tons of coal were shipped from the Delaware and Schuylkill watersheds, and 261,400 tons of coal dust were washed into these streams. The report of a commis-

*Engineering News, 57,.330.

sion appointed by Mayor Weaver discusses the general causes of pollution, the amount of coal dirt washed into the streams, and the methods for preventing the same. The pollution from coal washing plants and by the erosion of huge coal heaps alongside the streams is serious, though in some instances mining companies are intercepting the dust by subsiding basins. The present law is adequate to prevent pollution and better inspection is advised. The construction of sanitary sewers and an appropriation to cover the expense of forcing connection with existing sewers is also recommended.

STATE WATER SURVEY OF ILLINOIS.*—The Water Survey of Illinois has been in progress since 1895 and valuable data have been collected. Three bulletins have been published. The work was started under the direction of the late Prof. A. W. Palmer. The latest report, dated August, 1906, states that the Water Survey and the Board of Health of the state are co-operating in the work with the U. S. Geological Survey and the University of Illinois, the work being under four general subdivisions: 1.—Epidemics; 2.—Sewage Purification; 3.—Water Supplies; 4.—Streams. It reports a series of tests of the septic tank at Urbana, which is being operated under careful observation for the purpose of obtaining useful data. The total expenditure for the ensuing fiscal year for the study of the above problems amounts to $8,200, of which the U. S. Government contributes $3,000, the State Water Survey $3,200, and the State Geological Survey and the University of Illinois $1,000 each.

SEWAGE PURIFICATION IN WINTER.†—The author gives an account of his experience with sewage beds at Brockton, Mass., in winter. This is a very practical

*Eng. News, 57, 316.
†George E. Bolling, J. Assoc. Eng. Soc. 38, January. Eng. Rec. 55, 326.

paper, as it treats exhaustively of the methods employed to prevent freezing of the beds, including the furrowing of their surfaces and the systematic dosing of the same. The cost of furrowing and the degree of purification effected are also given.

MECHANICAL FILTERS OF THE WATER WORKS AT HARRISBURG, PA.*—This is an article describing a successful plant for purifying a rather difficult river water at a cost of $10.65 a million gallons. The system consists of subsiding basins, coagulating basin, filters and filtered water basins. Sulphate of alumina and soda are used as coagulants.

SEWAGE EJECTOR AT DULUTH.[1]—A description of a device for lifting sewage by hydraulic power.

COST OF A 66-INCH REINFORCED CONCRETE SEWER.[2]—Notes on the construction of a sewer at South Bend, Ind. The cost was $9 per lineal foot.

COST OF MECHANICAL FILTRATION AT BROOKLYN.[3]—Two of the Brooklyn sources of supply are purified by mechanical filtration. The plant at Baiseley's—capacity five million gallons per diem—furnishes water at a cost of $6.53 a million gallons, and that at Springfield—capacity three million gallons per diem—at a cost of $9.49. The former is operated at 80 per cent. of its capacity, the latter at 63 per cent. Sand filters would be preferable for the purification of the water which these

STATE CONTROL OF WATER SUPPLIES.[4] PENNSYLVANIA WATER SUPPLY COMMISSION.**—

*Eng. Rec. 55, 331.
1 Eng. Rec. 55, 336.
2 Eng. Rec. 55, 337.
3 Wagner and Coffin, Eng. Rec. 55, 342.
4 Eng. Rec. 55, 343.
**Eng. Rec. 55, 350.

On July 3, 1905, the Pennsylvania Water Supply Commission was appointed. Since this date 88 applications for the incorporation of water companies have been received, of which 37 have been approved, 9 disapproved, 20 are being investigated, and 2 were withdrawn. The commission has obtained many valuable data necessary to advise it of conditions of the water supplies of the state, including books, maps, blue prints, etc. The commission has diligently resorted to every available source of information. The act which established the commission was a very broad one, and it is now making a comprehensive study of the water supply with respect to:

1. Its natural condition.
2. As affected by population and manufactures.
3. As affected by appropriation for municipal and domestic purposes.
4. As affected by appropriation for water power and transportation.
5. As affected by obstructions to water courses.
6. As affected by forest cover, rainfall, floods, geology and topography.

The evident object of the act creating this commission was to confer upon a public body authority to preserve and equitably distribute the water supplies of the commonwealth for the common good of the inhabitants. It takes no account of the local distribution of the water; it goes to the source, and it is this that is to be preserved and equitably distributed. The powers which were conferred upon the commission are general and it is apparent that further legislation is needed to carry out the intent of the act, which aims to protect not only municipalities but also all users of water.

Among the subjects treated by the commission have been the obstructions to channels, due to the deposits of cinder, slag, earth and the like in them, and the build-

ing of wharves, embankments, dams, etc.; then again, the influence of the forests upon the flow has been studied, as well as the possibility of building reservoirs to conserve the flood waters, and in addition it aims to promote the proper development of the water power of the state.

The Engineering Record says editorially:

> It seems likely that before long the doctrine that the state owns the unappropriated water supplies within its boundary will not only be acknowledged generally, but will be the foundation upon which some sort of state control of the water supplies will rest, entirely apart from the control which is exercised as a measure to improve the condition of the public health.

It seems as if this was a step in the right direction, as it discusses not only public health but commercial problems, and is more likely to serve the interests of all the people than any special legislation. In this connection the editor notes that in New Jersey the powers of the Public Water Supply Commission have been increased. The most important feature of the bill is that all waters hereafter diverted in excess of the amount now being diverted must be paid for, whether diverted by a private person or a municipality. The highest court in the state has decided that all surface waters are the property of the state. The editor also asserts that it would be better if the authority of this New Jersey commission would be extended to include the use of water for power and industrial as well as municipal purposes.

LACTOSE BILE MEDIA IN WATER ANALYSIS.*—The author gives a further account of his favorable experience with this medium used for the classification of waters supposed to contain B. coli. "With its employ-

*D. D. Jackson, Eng. News, 57, 278.

ment more definite results on the sanitary quality of a water may be obtained than by any other test at present in use." It is also valuable for testing the efficiency of water purification plants.

TRICKLING SEWAGE FILTERS AT LAWRENCE.† —The author in a very carefully written article describes the operation of coarse grain filters at Lawrence for the past eighteen years and draws valuable conclusions from them. Among the subjects treated are the rates of filtration, the character of the sewage applied, the character of the effluent obtained, the character of the sediment in effluents, the storage of matter in filters, surface clogging, method of application of sewage, trickling filters in winter, materials for filling filters. Mr. Clark says that trickling filters are not a substitute for sand filters, which remove practically all the matters in suspension in sewage, but are simply devices for the quick oxidation of the putrefying matters in sewage, while allowing the larger body of stable or slowly decomposing matter to pass along with the effluent. It appears from the data, other things being equal, that the filters with as fine stone as will not clog are the most efficient. The degree of nitrification obtained increases rapidly as the depth of the filter increases, filters ten feet in depth producing an effluent containing at least four times as high nitrates as filters five feet in depth. The author believes that the device used at the Andover experimental filter of the Massachusetts State Board of Health, of which board he is the chemist, is the best means of applying sewage to trickling filters. The results show that it is feasible to operate trickling filters in eastern Massachusetts in winter, although all distribution devices would require more or less attention. For detailed data the reader is referred to the original article.

†H. W. Clark, Eng. News, 57, 397.

GARBAGE CREMATORY AT POST ONTARIO, N. Y.*—This article describes a satisfactory crematory designed to destroy eighteen tons of garbage in twenty-four hours.

RAILWAY WATER-SOFTENING.†—At the recent convention of the American Railway Engineering and Maintenance of Way Association, a committee reported on water service, especially water-softening. Two general types of softeners have been designed, the committee states, the continuous and the intermittent. A modification of the intermittent type is used on some railroads by utilizing the usual storage tanks for settling purposes. This practice is liable to provide too little time for reaction and subsidence prior to the water being drawn off into locomotives. The better designed of either of these types give good results. Practice has demonstrated that between three and four hours are necessary for the reaction between the water and the chemicals added to soften it. Water taken from running streams in winter requires a longer time for treatment. All softeners should be provided with some form of filter. Ample space should be provided for the accumulation of the precipitates.

THE PREVENTION OF STREAM POLLUTION BY STRAWBOARD WASTE.‡—This paper is an account of exhaustive experiments conducted by Professor R. L. Sackett of Earlham College, Richmond, Ind., and the author. Some idea of the extent of pollution of streams by waste liquors from strawboard factories may be gained from the statement that in 1900 over 10,239,000,000 gallons of liquor, containing about 184,700,000 pounds of straw and mineral matter and over 77,000,000 pounds of lime were discharged

*Eng. Rec. 55, 462.
†Eng. Rec. 55, 502.
‡Earle B. Phelps. U. S. Geological Survey, Water-Supply and Irrigation Paper, No. 189. Eng. Rec. 55, 497.

into the streams of certain states. The principal factories, 59 in number, are located within a comparatively small area. Indiana, Ohio and Illinois make about 80 per cent. of the strawboard produced in the country, and Indiana alone produces nearly 50 per cent. The present method of disposal of the waste is by preliminary sedimentation in open ponds. This method is unsatisfactory and unsavory. The author has shown by study and experiment that a short period of sedimentation, followed by mechanical filtration through sand without coagulants, will produce an effluent which can be discharged into most streams without producing a nuisance. Furthermore, the cost of this process is within reasonable limits. It is recommended that the sludge from the sedimentation tank could be dried or filter-pressed, and, it is stated, that some industrial use will be found for it.

BALTIMORE SEWERAGE WORK.*—Work on the new sewerage system is progressing at an unusually rapid rate. Over $3,000,000 worth of work has already been placed under contract, and $500,000 worth will be allotted soon.

CINCINNATI WATER PURIFICATION PLANT.†—This article is an excellent history and description of the Cincinnati Water Works, including a description of the purification plant, which is now being completed at an estimated cost of $6,500,000. This plant is to have a pumping capacity of 80,000,000 and a filter capacity of 60,000,000 gallons per diem. It will consist of settling reservoirs formed by damming natural ravines, from which the water will be led to the coagulation basins and filter plant. The settled water will be softened and coagulated before filtration by means of sulphate of iron and caustic lime. The softening and coagulation of the water will take place in two large coagulating

*Eng. Rec. 55, 436.
†Manahan and Ellms, Eng. Rec. 55, 430.

basins, from which the water is led to the filters, twenty-eight in number. Ample means have been provided for handling and feeding the chemicals used in the purification of the water, and the whole process is to be under the control of a laboratory. The filters are to be washed with water under greater pressure than has been customary heretofore, and a special strainer system is designed in accordance with these conditions. No compressed air or other mechanical device will be used to agitate the sand during washing. The strainer system includes a wire mesh screen placed between the gravel and the filter sand, of such a size that it would prevent the passage of the gravel upward but permit the passage of sand downward. This device prevents the displacement of the gravel during washing, and therefore the passage of sand to the screens of the strainer system. The filters are unusually large, each having a nominal capacity of 2,250,000 gallons per diem. For details of construction, etc., the reader is referred to the excellent original article.

HUDSON RIVER ICE SUPPLY.*—The quality of ice obtained from the Hudson River has been investigated by D. D. Jackson, Director of Laboratories, Department of Water Supply, Gas and Electricity of New York City. Less than half of the twenty-five samples collected were found to be good. The sources of contamination are chiefly the sewerage systems of various cities, especially Albany. The author believes that some of the typhoid fever must be due to the use of contaminated ice. Freezing eliminates many impurities, but does not render ice from contaminated water entirely harmless, especially when the ice is not stored before using, as is frequently the case along the Hudson river. Sewage, being warmer than water, floats, and the practice of flooding ice during the winter causes considerable sewage matter to be frozen into the ice. Sometimes this matter

*Eng. News, 57, 430.

occurs in layers distinct enough to be apparent to the eye. More stringent regulations are recommended,—among them the taking of ice from certain contaminated points,—for example, between Albany and a point five miles below, and in the vicinity of other large towns and cities. Ice should not be cut from contaminated sources if intended to be used for domestic purposes, and should be used for other purposes only under the supervision of the sanitary authorities.

WATER STERILIZING AND SOFTENING PLANT AT THE LEAVESDEN ASYLUM, ENGLAND.†—This is a device for softening the water by boiling with steam. It removes the temporary hardness only. The precipitate is deposited on trays similar to those used in a food water heater. The plant (capacity 260,000 gallons per diem), was installed with a guaranty that it would reduce the hardness from 19 degrees to 9 degrees, Clark's Scale, and that the difference in temperature between the incoming and outgoing waters would be less than 20 degrees F. With coal at $3.20 a ton, the cost of softening is about $25 a million gallons.

BOOK REVIEWS.

A Compend on Bacteriology. By R. L. PITFIELD.. (P. *Blackiston's Son & Co., Philadelphia,* 1907.)

The attempt to condense a large subject into a brief compendium or "cram-book" is one of those things one is tempted to wish undone rather even than well done. To do it well requires complete knowledge of the subject-matter, rare judgment and discretion and much literary skill. Such a task Dr. Robert L.

†Eng. News, 57, 272.

Pitfield has attempted in "A Compend on Bacteriology." He covers in 222 small pages The Classification, Morphology and the Biology of Bacteria, Products of Bacterial Energy, Infection, Immunity, Bacteria, Animal Parasites, Study of Bacteria, Bacteriological Laboratory Technic, Antiseptics and the Bacteriology of Water, Soil, Air and Milk. None of these subjects are treated broadly so as to bring out their fundamental principles in a general way. In each case the author goes into most minute detail; and in so doing he displays considerable power of compact statement. The chapter on immunity, for example, is a remarkably clear summary for its brief compass. On a first glance the reader marvels at the mass of material compressed into such narrow space. If acquainted with the science of bacteriology, however, his wonder is soon directed rather toward the ease with which Dr. Pitfield settles vexed problems of bacteriology with a stroke of the pen. He learns for example that the flagella are without doubt or qualification a prolongation of the capsule, that "metals act as lethal agents in the presence of light and water, by forming metallic peroxides," and that the theories of Metchnikoff and Ehrlich, are "extremely ingenious and explain satisfactorily why certain bacteria are unable to infect the body" and later that "these theories make it clear to us why the body tissues during life do not fall an easy prey to many putrefactive bacteria, as after death."

Under scarlet fever he learns that Mallory assumed that the Cyclaster scarlatinae was the etiological cause of the disease (which he carefully refrained from doing). It is not surprising that when wandering afield into sanitary engineering Dr. Pitfield should make the erroneous statement that "sewage may be treated in sand filters or it may be run out on land where over 200,000 gallons may be disposed of on an acre of land a day." Chemistry, too, might be expected to be weak although the statement that fermentation is "the chemical transformation of carbohydrates by the action of bacteria, with the evolution

of CO_2, CO and H" is staggering. There is no excuse, however, for the following definitions from a bacteriologist:

"When bacteria exhibit many, or various forms, in the same culture, as does the typhoid bacillus, we speak of it as *pleomorphic* or pleomorphism. To elucidate: Man is pleomorphic, because among adult individuals some are tall, or short, fat or thin.

"It is common to speak of bacteria that differ from the adult forms, by reason of age and growth, as involution forms. To explain: Infants, children and those past puberty, but who have not yet become adults, are in a state of involution, or development."

Such extracts as these Job must have had in mind when he wished his enemy had written a book. It would be malicious to cite them if they were exceptional; but similar misstatements may be found on almost every page. The chapters dealing with laboratory technique are as bad as the theoretical discussions. The student who desires to make a water analysis is told to count the colonies on a gelatin plate which has been kept in "a cool, dry place" for "twenty-four to thirty-six hours." The indol test is to be made with "pure sulphuric acid" and sodium nitrate. Str. pyogenes is said not to ferment sugars while it is really one of the most active of acid-producing organisms. Even the method given for the making of ordinary media is antiquated and imperfect. Five per cent. salt and 10 per cent to 15 per cent. gelatin are to be added in nutrient gelatin, the acidity is to be adjusted without titration by adding 5 per cent normal hydrochloric acid and at the end "litmus, or lacmoid, or neutral red may be added to the gelatin as an indicator" (in gelatin be it remembered). Evidently the author is quite innocent of all acquaintance with the accepted standard methods.

It is altogether astonishing that so superficial and inaccurate a book should have been written by the pathologist to two hospitals and printed by a reputable publisher.

C. E. A. WINSLOW.

The New Hygiene: Three Lectures on The Prevention of Infectious Disease. By ELIC METCHINIKOFF. *With Preface by E. Ray Lancaster.* (*Chicago, Keener & Co.,* 104 *pp. Price* $1.00 *net.*)

This little book intended for lay as well as medical readers consists of three (Herben) lectures delivered before the English Royal Institute of Public Health. The subjects are drawn from the work on which Metchinkoff has been engaged for the last quarter century. The first lecture deals with "The Hygiene of the Tissues." Quite naturally the author seizes the opportunity to emphasize anew the importance of phagocytosis as *the* means of protecting the body against infectious disease. He discusses Wright's opsonic theory and triumphantly demonstrates to his own satisfaction that the opsonins are not essential bodies in phagocytosis since, if given time enough (2 hours) white corpuscles will show the same degree of activity against bacteria in physiological saline solution as against bacteria which have been acted upon by blood serum. He further states that even if the opsonins are essential bodies they are themselves products of the microphages and that therefore the microphages are the fundamentally active elements in the protection of the tissues. He quite properly lays stress upon the importance of recognizing the harm done in treatment by the use of the inhibitors of activity of the microphages, such as alcohol and quinine, it having been demonstrated that there is not only a diminution in phagocytosis in the presence of these substances, but also a diminution in the amount of protective humoral substances produced. The value of foreign blood sera such as horse serum (heated to 55 degrees C to prevent toxic action) as a means of increasing white cells and also their protective action is illustrated by reference to researches and results from practical hospital use.

The second lecture deals with "The Hygiene of the Alimentary Canal." In this the author treats broadly of intestinal in-

fection and specifically of the importance of animal parasites as introducers of infection. He evidently believes that intestinal worms are the means by which most appendiceal processes are brought about; this in spite of the fact that worms are found in a very small percentage of cases. He lays down a series of rules for sanitary living such as the drinking only of boiled water, the pasteurization of all milk ingested, the thorough cooking of all foods, with abstinence from raw vegetables and fruits or thorough scalding of their surfaces. He asserts that "no one can deny that a system based on the principles above laid down will insure the body against all sorts of diseases of the intestinal apparatus." With this, of course, one has to agree.

Reference is made to his researches in intestinal putrefaction and the value of the normal intestinal flora, notably the bacillus acidi lactici, in keeping down putrefactive organisms. The use of cultures of B. Acidi lactici in supplying intestinal needs in this direction, is recommended.

The third lecture is entitled Hygienic Measures against Syphilis. After a review of literature covering the incidence and manner of spread of syphilis, this lecture considers in some detail the results of inoculative work in monkeys and the use of antiseptics after suspicious exposure, the early work on both of these sides of the subject having been done in large part at the Pasteur Institute. The possibilities of producing a curative serum are definitely negatived. The possibility of attenuating the virus is suggested as a result of an accidental inoculation of one of the laboratory attendants with virus modified by passage through a macacus monkey. This virus produced a local sore on the lip, unlike the primary sore of syphilis yet teeming with spirochaetae. It was followed by no development of secondaries. Whether immunity against the unmodified virus was conferred or not is a question, inoculation with similar material by other observers failing to protect against the development of secondaries after the primary sore had appeared. For prophy-

lactic use after suspicious exposure ointments heavy with salts of mercury or similar agents are recommended, washes even with bichloride 1-2000 or the injection of similar solutions having failed to prevent the occurrence of a primary sore or the spread of the process.

The lectures are written in the fascinating style which makes non-scientific as well as for the scientific mind. They cover Metchinkoff's dicta on scientific subjects good reading for the much of the recent work in hygienic progress along certain lines. Throughout them shines the broad humanitarian spirit of the author, who has shown himself a fitting successor to Pasteur. Whether one agrees with all of his conclusions or not is a matter apart. This little book is recommended to all who would spend a few hours with one of the master minds of scientific medicine.

TIMOTHY LEARY, M.D.

Plaster of Paris and How to Use It. By MARTIN W. WARE, M.D., (*Surgery Publishing Company, New York,* 1907.)

There is probably no one material which could be spared from the surgeon's armamentarium with so great loss as plaster of paris. Common and cheap as it is, it is surprising how inefficiently it is used. This, combined wth the fact noted by the author of this little monograph, viz.: that the commercial preparations of plaster of paris are extremely imperfect, justifies the putting out of a book such as this is. Every surgeon should be familiar with the facts stated here, and few can read it and not glean valuable suggestions from its perusal.

In the first and second chapters the materials employed in the manufacture of plaster of paris bandages are discussed. Emphasis is laid upon the use of crinoline as the carrier of the plaster. Nearly all crinolines are sized with glue, and it is of the utmost importance that this should be washed out

of the mesh of the crinoline before it is used. The "Arawana" brand of crinoline best meets the requirements of a good bandage material. "Monarch" gauze is sized with starch. This makes a bandage which sets a little more slowly, but can take a higher finish and renders the splint more durable and will permit of the use of less plaster bandages.

The author justly claims that hand-rolled bandages are the best. There are, however, one or two good bandage rollers with which it is possible to roll loose and not too heavily-laden bandages. In practice, too little attention is given to the construction of "molded splints," to which the author refers. Plaster cream used to impregnate seamless tricot or stockinette makes it possible to construct light, removable, well-fitting splints to most any part.

The author's suggestions as to the protection of the operator, the patient, the floor, etc., while doubtless necessary, would have been better if supplemented by the remark that a really skilful handler of plaster of paris should be able to put on a plaster bandage without any such protection. Emphasis should be laid upon such dexterity. A practical point in the wringing out of bandages is to hold the ends of a plaster bandage forward against the palms of the hands. In this way plaster is not syringed out and wasted. Fraying of the ends will not occur if the gauze or crinoline is cut in the required widths by first pulling a thread.

The best protection for the skin and at the same time the material over which the most even compression can be effected is to be had by the use of unglazed sheet wadding. Tricot is good but not as good in cases of early fracture or where there is to be a long continuance of the plaster. The directions as to application and precautions would have been more complete had the author insisted upon the value of rubbing in the plaster of each layer of bandage as it is laid on. This adds greatly to the durability of the

bandage. Renewing as ordinarily employed in bandaging with a cotton roller or gauze is not to be recommended, but folding the entire width of the bandage upon itself enables one to ascend a truncated cone smoothly and to reinforce the bandage at the point most needing it without adding unnecessarily to the weight of the splint. Absorbing of excess of water by the application of towels during the process of setting hastens that process. The author utters no word of warning against the employment of more bandages than are necessary. The tendency among amateurs in the use of plaster of paris is to make their splints too heavy. Good practical suggestions are made as to the method of removal and the means for so doing. The most efficient method is by means of a sharp leather cutter's knife, cutting through a groove which has been marked in the cast and into which water has been dropped from a medicine dropper. The Gigli saws, lead strips to cut down upon, or fancy plaster shears or saws of any description, are only used by novices. Stern and Meisenbach have both prepared elaborate tables showing the way in which the tensile strength and the setting properties of plaster of paris may be influenced by the addition of various materials to the plaster. Their work should find mention in a consideration of this subject.

Chapters three and four are devoted to a consideration of the fractures to which plaster dressings are most applicable, and with the possible exception of seeming to advocate a rather too early employment of the plaster bandage in a class of cases where there is likely to be considerable swelling, which cannot be wholly accommodated within a plaster splint, the principles and suggested methods should meet with general acceptance. The author's method of fenestrating a plaster is a good suggestion and is eminently practical. Of particular interest were the

details of the use of plaster in fractures of the humerus and forearm near the elbow.

Chapter five deals with the methods of making moulded splints or splints made by impregnating hemp, tricot, flannel, etc., with plaster cream and shaping them to the parts which it is desired to fix. Numerous illustrations indicate clearly the many practical uses of this form of splint.

Chapter six treats of the use of plaster in orthopaedic surgery, describing in detail the suspension methods of applying plaster jackets, also the recumbent methods, both prone and supine. The feature which is most helpful in this connection, however, is the detail of making plaster beds and adding the head supports in cases of Pott's disease or torticollis where a plaster helmet is necessary in addition to the jacket. The method of securing further correction in club foot operations after the foot has been encased in a cast without removing the cast, according to the method of Wolff, is well illustrated.

The last chapter concerns itself with the uses of plaster in dental surgery, and though of no probable value to a skilled dentist, and no other would be tempted to resort to the use of plaster in such cases, its description here serves to round out the book.

The author has produced a helpful and timely little volume which should lead to the more skilled use of a very valuable material.

CHARLES F. PAINTER, M.D., Boston.

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"Present Status of Morphological Types of *B. diphtheriæ*"—*Hill*

P. 158 line 10 for "from E1 to G2 should be excluded"
read "from D1 to G2 should be excluded

P. 162 lines 29-30 for "and E1 E2, F1 F2, G, G1 and G2 as negligible"
read "and D1 D2, E1 E2, F, F1, F2, G, G1 and G2 as negligible"